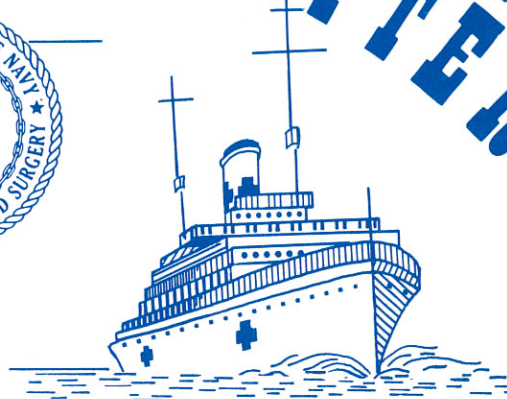


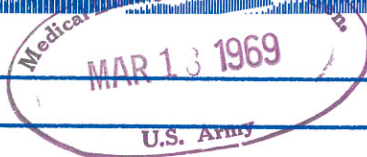
UNITED STATES MEDICAL NEWS LETTER



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United States Navy
MEDICAL NEWS LETTER

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The U.S. Navy Medical News Letter is basically an official Medical Department publication inviting the attention of officers of the Medical Department of the Regular Navy and Naval Reserve to timely up-to-date items of official and professional interest relative to medicine, dentistry, and allied sciences. The amount of information used is only that necessary to inform adequately officers of the Medical Department of the existence and source of such information. The items used are neither intended to be, nor are they, susceptible to use by any officer as a substitute

for any item or article, in its original form. All readers of the News Letter are urged to obtain the original of those items of particular interest to the individual.

Change of Address

Please forward changes of address for the News Letter to Editor: Bureau of Medicine and Surgery, Department of the Navy, Washington, D.C. 20390 (Code 38), giving full name, rank, corps, old and new addresses, and zip code.

The issuance of this publication approved by the Secretary of the Navy on 4 May 1964.

U.S. NAVY MEDICAL NEWS LETTER VOL. 53 NO. 3

SPECIAL ARTICLES

A LETTER FROM THE SURGEON GENERAL

As I begin my term in office, I think it fitting that one of my first acts should be to use this means to extend personal greetings to every member of the Medical Department, and to pass on to you some of my thoughts concerning the future.

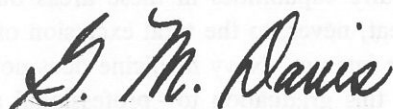
I succeed a man who devoted every energy to the advancement of Navy medicine throughout his brilliant career, and who, as Surgeon General, led the Medical Department through four of its most productive years. Admiral Brown has left a legacy of which we can all be proud.

Yet, our job is never over. I approach my new duties fully aware of the great responsibilities which face us, but with the comforting knowledge that behind me stands the finest group of men and women in the medical profession, who have capably met every challenge in the past.

As for our future, I intend to do all that I can during my tenure in office to ensure that the Medical Department will provide the highest quality of medical care to all our patients. It is my hope that this care will satisfy not only the patient receiving it but also the staff providing it. I will continue to seek ways to refine and improve the training programs for all medical personnel, enlisted and officer. I propose to broaden our research base not only in the operational medical areas, but also in the clinical areas. Every effort will be made to develop new programs and opportunities that will enhance the attractiveness of a career in Navy Medicine.

Fully-attaining these aims and objectives will not be easy. Yet I'm confident much progress can be accomplished. I welcome your suggestions; I value your loyalty; I am proud of our past, and with your continued support I am confident for our future.

Sincerely,



G. M. DAVIS
Vice Admiral, MC, USN
Surgeon General

FAREWELL ADDRESS BY:
VICE ADMIRAL R. B. BROWN, MC, USN
SURGEON GENERAL, U.S. NAVY

The first step in adjusting to retirement from active duty is to realize and to accept the fact that the time has actually arrived. Today's ceremony is rather convincing on that score and I am greatly honored that so many of my good friends are here to share the occasion.

A career in the Navy Medical Corps has been a most rewarding one. Many factors have combined to make it so. Initially, my decision to remain in the Navy after World War II was based on two principal factors. I had learned that Navy medicine provided the opportunity to practice my clinical specialty, surgery, under most favorable conditions. Secondly, I had a strong desire to participate in and contribute to the new and expanding Residency Training Programs. These original two reasons for electing a career in Navy medicine have more than stood the test of time. The decision has been reinforced by many additional incentives.

The stimulation of new professional surroundings and personnel with each change in duty station; the increase in responsibilities that accompanies increase in professional stature and assignment; the opportunity to participate in medical research; yes, even the occasional necessity to provide medical support to our forces in armed combat all have added up to the practice of surgery under close to ideal circumstances. It was my privilege to enjoy over 20 years of such clinical practice and I recommend it highly.

Then comes the day when, by virtue of seniority, experience, motivation, and potential, one is eligible for professional administration and command. It is true that many of our top assignments in the Medical Corps require capabilities in these areas but never, and I repeat, never, to the total exclusion of clinical practice or interest. Navy medicine does not have a corner on this graduation to "professional administration." Senior academic surgeons in civilian life are faced with a similar and sometimes overwhelming increase in administrative responsibilities.

This switch to command and administration has been not only painless but most gratifying to me. New and intensely interesting problems in other professional areas make up for the cut-back in practice

of one's specialty. Particularly rewarding is a look back to see young medical officers you have helped to train advancing so capably into the clinical opportunities which you have just vacated.

But what is the single, most important ingredient, making a life and work in the Navy so attractive? The answer is people—the *right* people. The pleasant and fruitful association with other members of our great Navy and Marine Corps family—as neighbors, as friends, even as patients—has been cherished. The loyalty, dedication, and contributions of my fellow medical officers, dental officers, nurses, Medical Service Corps officers, and corpsmen defy proper recognitions and praise. The civilian members of our Medical Department team, they, too, are essential to the accomplishment of our mission. But no department or organization in this day and age is self sufficient. Particularly during my term as Surgeon General have I been impressed with a profound obligation to the many friends outside the Medical Department who have supported our programs. I speak of the Secretary of the Navy, the Chief of Naval Operations, the Commandant of the Marine Corps and a host of others within the Navy Department; the Deputy Assistant Secretary of Defense (Health and Manpower) and many backers in the Office of the Secretary of Defense; The Congress; and, indeed, The President himself. I include, also, counterparts in our sister Federal medical services and a host of individuals, organizations, and societies in the civilian community, both lay and medical.

To all of you I express my deep appreciation and gratitude. I thank you in advance for the close support you will continue to provide to the Navy Medical Department and my most capable successor, Admiral George Davis. Great challenges lie ahead in our constant effort to improve medical care, medical support to the operating forces, training, research and, *with it all, the career attractiveness of Navy medicine.*

In closing, I wish to recognize that one person who has had the most to do with my happiness as a Naval Medical Officer, my dear wife Janey. With her at my side retirement from active duty loses most of its sting as it marks our entrance into an exciting new life together. God bless you all.

ADDRESS BY VICE ADMIRAL ANDREW McB. JACKSON, JR., USN,
INTERN GRADUATION CEREMONY, NAVAL HOSPITAL, ST. ALBANS,
N.Y., 28 JUNE 1968

It is an honor and a privilege to address this graduating class of interns.

I am glad to see so many of your friends and relatives on hand this morning. I know how proud they must feel, because a couple of weeks ago, at a ceremony like this one, I watched my daughter receive her Doctor's Degree. Now her degree wasn't in medicine, it was in nuclear physics—but with your permission, I'm going to think of her as "my daughter, the doctor" anyway.

Of course I imagine all of you are pretty used to being called "doctor" by now. But as of today, you can wear that proud title with new meaning. Through sacrifice, determination and dedication you have truly earned the honor and respect we pay to you today. You studied long hours at medical and dental school to gain the knowledge you have put to use here at St. Albans, and I have no doubt that you worked even harder during the period of internship you have just completed.

In fact, after what you gentlemen have been through lately, it is probably a novel experience just to be able to sit down for a while. I don't mean to imply that you can afford to rest on your laurels. But you will now have a little more time for some of the things that have been denied you in the press of your duties—things like specialized research, or non-medical reading, or an occasional evening at the theatre. Perhaps you will even be able to get reacquainted with your wives and families.

But I hope that you will use some small part of your new leisure time to consider the implications of the kind of life you have staked out for yourselves.

You have chosen not one but two professions. The first, of course, is the ancient and honorable calling of physician. Your second profession, just as ancient, and, I venture to say, just as honorable, is that of an officer in the Navy.

Historically, the two are closely intertwined. The position of the "ship's surgeon" or seagoing doctor has been an honored one ever since the founding of our Navy. The physician, in fact, is the prototype of the kind of officer-specialist we have been obliged to develop to an increasing degree in our Navy, as the explosion in technology has presented us with complexities that no single individual can hope to master fully.

The scope of the Medical Corps has expanded along with technology. The main task of the corps

is still, of course, the practice of medicine—as it always has been and always will be. But in addition, today's Navy doctors are involved in a tremendous range of medical, biological and psychiatric research.

Your training in medicine or dentistry has been long, arduous, demanding and difficult. By comparison, your formal training in your second profession—that of a naval officer—has been somewhat sketchy.

Even if I wanted to, I could not tell you what it means to be a naval officer in a single short speech on a summer morning. Even a hundred speeches could not tell you that.

The true meaning of officership is something you will come to appreciate on your own—with the help of experience, observation, and common sense.

But I do want to impress upon you the importance of not neglecting this aspect of your careers. You are medical men, but you are also military men. As long as you remain in the Navy, you will not be just "Dr. Smith" or "Dr. Brown" or "Dr. Jones"—you will also be "Lieutenant Smith" or "Commander Brown" or "Captain Jones."

None of you would use unsterilized instruments in the operating room. None of you would prescribe drugs lackadaisically or without regard to their side effects. And you must be equally scrupulous in your attention to your military duties.

Three hundred years ago, a British General described the officer's duty to his men in these words:

"He is to take notice of what discords, quarrels, and debates arise among the soldiers of his band; he is to pacify them if it may be; otherwise to commit them; he is to judge and determine such disputes with gravity and good speeches, and where the fault is, to make him acknowledge it and crave pardon of the party he hath abused. He is to be careful that every soldier hath a sufficient lodging in garrison, and in the field a hut; he is also to take due care of the sick and maimed, that they perish not for want of means or looking into."

As medical officers, your special mission is, in the words of that British General, "To take due care of the sick and maimed." That is an awesome responsibility. It is a significant part of the larger mission of the Officer Corps, and you share in that mission as well.

Compared to a graduate of the Naval Academy, or a product of one of our other programs such as Offi-

cer Candidate School or R.O.T.C., your military training has been cursory. Nevertheless, I am not worried about what kind of officers you gentlemen are going to make. You are going to make good officers.

I say this because the qualities that make a good doctor and the qualities that make a good officer have a great deal in common.

In this sense you are lucky. You have acquired many officer-like traits already—or you would not be sitting here today. If you can learn to apply these traits to the military aspect of your life in the Navy as well as the medical, you will be able to excel in the arts of leadership as you have already proved you can excel in the arts of healing.

I could cite dozens of examples that would show you what I mean. But four qualities spring to mind immediately as intrinsic to both the medical and naval professions. They are self-discipline, confidence, judgment and responsibility. This does not, of course, exhaust the list of qualities characteristic of a good medical man or a good Navy man—not by any means. But without these qualities, a man cannot become much of a doctor—or much of an officer, either.

Self-discipline is something that you have simply had to acquire. It is difficult to imagine anyone's completing medical school, and then surmounting the rigorous hardships of internship, without having this quality as part of his character.

Unlike simple obedience, self-discipline is not something that can be imposed from outside. It takes time to learn the measure of one's own inner resources—intellectual, moral and emotional—and time to learn how to use those resources most effectively. A physician needs self-discipline because without it he can be master neither of his science nor of the very difficult human situations into which his work brings him almost daily. An officer needs it because his ability to command the respect and loyalty of those who serve under him depends partly on the personal example he himself sets. He must submit to his own discipline if he expects others to do the same.

Confidence is another quality that your two professions aspire to in equal measure. It is as important for the officer to inspire the trust of his men as

for the physician to inspire the trust of his patients. General Sherman once wrote that "The true way to be popular with troops is not to be free and familiar with them, but to make them believe you know more than they do." He could have been talking about the reassuring doctors' habit of seeming to be aware of everything that is going on and of having it all well in hand. But as you know, real confidence involves much, much more than a comforting bedside manner or an appearance of superior knowledge. Confidence must be rooted in competence, or it quickly becomes mere recklessness.

Judgment, too, is a common requirement of physicians and officers, particularly the ability to keep a cool head and make the correct decision under conditions of intense stress. The surgeon at a critical juncture in a major operation and the officer leading men at an uncertain moment in battle face rather similar situations in terms of the demands made on their powers of judgment. Decisions must be taken immediately, in spite of terrific emotional pressure. And they must be the right decisions. The difference between life and death can be as simple as the difference between calm judgment and unreasoning panic.

Finally, there is the quality of responsibility. The profession of medicine is one of the most responsible in the world, because the stakes are the highest imaginable—human life itself. A man who chooses a career as a military officer takes on comparable responsibilities. He, too, may be entrusted with the lives of others. Like the physician, the Naval Officer is seldom the kind of man who wants to sit on the sidelines of life, with as little trouble—and as little excitement—as he can manage. Like the physician, he is not afraid to be held accountable for his actions. Indeed, he welcomes the challenge.

As medical and dental officers, gentlemen, you wear two hats. I think you will find that both of them are tailored to the same specifications. Wear them both with equal pride and equal dedication.

Each of you is a member of two great professions. As physicians and dentists you have demonstrated your competence and zeal. As officers of the United States Navy, I trust you will do no less. I congratulate you.

Thank you.

MEDICAL ARTICLES

RECOGNITION OF PULMONARY EMBOLISM

Harold L. Israel, MD, and Robert H. Schwab, MD, Medical Service, Philadelphia General Hospital (Jefferson Medical College Division), Philadelphia, Pennsylvania, Geriatrics 23(6):103-110, June 1968.

Pulmonary embolism has replaced pneumonia as the most common lung disease in hospital practice and it has replaced syphilis as the great imitator. The numerous guises of its manifestations made its clinical recognition in the past something of a rarity: a review of records at the Philadelphia General Hospital revealed that in 1950 a diagnosis of nonfatal pulmonary embolism was made in only 11 patients. In recent years, interest in the clinical recognition of pulmonary embolism has been greatly heightened by recognition of its frequent occurrence; by a succession of instructive clinical, radiologic, and electrocardiographic studies; and by the development of enzymatic, isotopic, and angiographic diagnostic techniques. Equally stimulating have been advances in cardiorespiratory physiology and refinement of medical and surgical therapeutic measures.

The genesis of pulmonary embolism, in venous thrombosis, results either from injury to the venous endothelium, from venous stasis, or from hypercoagulability of the blood. Thromboembolism may occur at any age, but it is the elderly who are most likely to have venous stasis as the result of congestive failure, immobilization in a cast, hemiplegia, or mere sedentary inactivity. Venous injury in the aged may result from a fall, a fracture, or surgical trauma.

The clinical, radiologic, and electrocardiographic features of pulmonary embolism are most commonly confused with those of pneumonia, pleurisy, and myocardial infarction. In every instance in which these illnesses are encountered, careful scrutiny is essential to exclude the possibility of diagnostic error of an overlooked pulmonary embolism. The number of other disorders which thromboembolism may simulate is not generally appreciated. The list is a long and varied one, encompassing most of the specialized fields of medicine and surgery: asthma, cardiac asthma, cardiac arrhythmia, fever of undetermined origin, hyperventilation syndrome, angina pectoris, pulmonary neoplasm, and postoperative atelectasis.

Appreciation of how a single pathologic process can produce such varied manifestations requires a comprehension of the functional changes produced by pulmonary embolism. The spectrum of pathologic physiology ranges from the impact of a single small

clot, to recurrent small emboli, to showers of small clots, to obstruction of major vessels, to occlusion of the pulmonary artery trunk.

Pulmonary hypertension is the essential physiologic feature, transient with small emboli and persistent with massive or recurrent embolism. It is probable in the case of small or moderate-sized emboli that the hypertension is produced by spattering of smaller fragments of clot widely through the vasculature. The physiologic and clinical consequences of the pulmonary hypertension are reflected both backward (right ventricular dilation, engorged cervical veins and liver) and forward (diminished left ventricular output, decreased systemic blood flow, impaired coronary and cerebral perfusion, hypotension).

Thanks to the dual blood supply of the pulmonary parenchyma, infarction is usually limited in magnitude. The densities visible in the chest roentgenogram largely represent atelectasis, mediated by the loss of surfactant which quickly follows obstruction of pulmonary artery flow.

When sizable infarction occurs, collaterals develop not only from the bronchial arteries but also from intercostal and internal mammary vessels. The consequent left-to-right shunt increases left ventricular work and may precipitate failure of a damaged left ventricle.

An associated feature of pulmonary vascular occlusion of considerable interest is generalized or focal bronchospasm. Physiologic studies have demonstrated the bronchial constriction to be unresponsive to bronchodilator drugs but relieved promptly by heparin.

Gradual obliteration of the pulmonary vascular bed by recurrent showers of small emboli will result in impaired alveolar-capillary gas exchange due to ventilation of poorly perfused portions of lung. The anoxemia as well as the diminished vasculature is responsible for pulmonary hypertension and eventual right ventricular hypertrophy.

As a general rule, right ventricular manifestations predominate in younger patients with unimpaired left ventricles. In older patients with coronary arteriosclerosis, however, the clinical and electrocardiographic features of left ventricular insufficiency often

overshadow the available evidence of pulmonary hypertension.

The clinical manifestations of pulmonary embolism are as varied as the physiologic disturbances. Pulmonary embolism may simulate a wide spectrum of disorders, acute or chronic, common or rare, and predominantly circulatory, respiratory, or neurologic.

Cardiovascular, pulmonary, and neurologic manifestations of pulmonary embolism. Myocardial infarction and coronary insufficiency. Patients with precordial pain and electrocardiographic changes seemingly indicative of myocardial ischemia may in fact be suffering from pulmonary embolism. Although pulmonary embolism is frequently characterized by pleuritic pain, older persons with coronary arteriosclerosis commonly experience pain of myocardial origin, simulating either acute coronary occlusion or chronic coronary insufficiency. Electrocardiographic changes may resemble those of diaphragmatic or antero-septal infarction, and only the transient nature of the abnormalities and slight axis shifts permit the alert interpreter to recognize the pulmonary basis for the electrocardiographic abnormalities.

Cardiac arrhythmias. Transient atrial fibrillation or flutter is a common manifestation of pulmonary embolism and in patients with traumatic injuries or convalescent from surgery its occurrence should lead to suspicion of thromboembolism. The sudden onset of arrhythmias in patients with heart disease, a common precipitating cause of congestive heart failure, is often the result of thromboembolism.

Refractory congestive heart failure. Unrecognized pulmonary emboli often precipitate congestive failure and, just as often, are responsible for failure of response to digitalis and diuretics. Even when substantial evidence for associated thromboembolism cannot be demonstrated, patients with refractory heart failure should be given anticoagulant therapy. It is probable that the most common cause for failure to respond to conventional cardiac therapy is associated thromboembolism.

Cardiac asthma. The frequency with which bronchospasm is caused by pulmonary embolism has only recently been appreciated. Sudden wheezing which may be unilateral is especially suspicious of pulmonary embolism. Patients in congestive failure who have a wheeze unresponsive to bronchodilators should have a trial of heparin. A prompt response is indicative of a thromboembolic basis for the airway narrowing. Serial electrocardiograms may be helpful in distinguishing wheezing secondary to pulmonary embolism from that due to left ventricular failure.

"Primary" pulmonary hypertension. Occasionally right ventricular hypertrophy is encountered in the absence of obvious pulmonary or cardiac causes. Although this may be a primary anomaly of the pulmonary vasculature, more often it is the result of repeated subclinical pulmonary emboli which ultimately reduce the vascular bed to the point of insufficiency and hypertension.

Pneumonia. The illness most commonly confused with pulmonary embolism is pneumonia. Early in the course of the illness, clinical, laboratory, and radiologic manifestations are so similar that differentiation may be impossible; serial roentgenograms and electrocardiograms as well as isotope lung scans permit more accurate diagnosis.

Features indicative of embolism include: absence of prior upper respiratory tract symptoms, rapidly recurrent episodes, bloody expectoration, slow defervescence, multiple ischemic areas on lung scans, rapid or gradual roentgenographic clearing with linear residuals, and sanguineous pleural effusions.

Pleurisy. Pleuritic pain in the presence of a normal chest roentgenogram is more often the result of embolism than infection. Small pleural effusions, especially if serosanguineous, are more commonly due to embolism than to pneumonia or tuberculosis. Massive, recurrent effusions are an uncommon but occasional manifestation of embolism.

Atelectasis. The dominant roentgenographic feature of pulmonary embolism is atelectasis due to loss of surfactant caused by pulmonary artery occlusion. Although bronchial obstruction from aspirated material remains common in alcoholics and in the presence of esophageal disorders, it should be recognized that modern anesthesia has made postoperative aspiration a rarity. Embolism is far more common a postoperative complication than aspirational atelectasis, except perhaps after thoracic surgery.

Asthma. The importance of recognizing pulmonary embolism as a cause of bronchospastic wheezing has been mentioned. This possibility deserves special consideration in persons developing episodic asthma in later life.

Tachypnea. The sudden onset of dyspnea in a patient whose examination is negative save for tachycardia and whose chest roentgenogram is normal may be misinterpreted as a manifestation of the hyperventilation syndrome.

Cerebral insufficiency. Transient strokes or convulsive seizures are not uncommon results of pulmonary embolism. In older patients, cerebral arteriosclerosis makes focal ischemia an early sign of reduced cardiac output. Fatal pulmonary embolism is

often preceded by minor episodes of transient cerebral ischemia.

Diagnostic tools for the recognition of pulmonary embolism. Familiarity with the clinical guises in which pulmonary embolism may be manifested and awareness of the significance of such etiologic factors as minor and severe trauma, immobilization, and circulatory stasis should lead to frequent consideration of the diagnosis of thromboembolism. The methods of diagnosis, old and new, may be enumerated as follows:

History. The salient historical features of pulmonary embolism are sudden onset and episodic recurrence. Symptoms may be catastrophically severe or so slight as to be elicited only by persistent inquiry. Most fatal emboli are preceded by minor episodes. The final catastrophe is unexpected only because warning incidents of minor pain, hemoptysis, tachypnea, fever, and palpitation are overlooked.

The most common symptoms of pulmonary embolism are chest pain, pleuritic in 72 percent of cases and anginal in character in 56 percent, and shortness of breath in 46 percent.

Physical examination. A meticulous physical examination is essential in order to elicit signs which will support the diagnosis of pulmonary embolism. The most common findings are fever, 70 percent; rales, 63 percent; tachycardia, 59 percent; tachypnea, 44 percent; hemoptysis, 29 percent; hypotension, 26 percent; congestive failure, 26 percent; and pleural friction rub, 24 percent.

Jugular venous pulse: The neck veins should be carefully inspected. The supraclavicular area in a patient reclining at 45° is 8.5 cm. above the level of the right atrium. Since the normal central venous pressure is 3.5 to 8 cm., the pressure is elevated if the neck veins are observed to be distended in a patient reclining at a 45° angle.

Venous pressure elevation in patients who are in shock or who are dyspneic with "clear" lungs is suggestive of pulmonary embolism. A prominent A wave may be observed if right ventricular hypertrophy develops. A V wave may be evident in functional tricuspid insufficiency due to right heart failure.

Heart: Palpation may be normal, but if persistent pulmonary hypertension develops, a left parasternal systolic lift is usually palpable. The onset of right heart failure is accompanied by a palpable diastolic "whobble" or "shudder" which is the equivalent of a ventricular diastolic gallop.

Auscultation may reveal a transient increase of the second sound in the pulmonary area. This is usually narrowly split. With the development of severe pul-

monary hypertension, the second sound may be widely split, with minimal respiratory variations in the duration of the split, mimicking the wide fixed-split second sound of an atrial septal defect.

A transient ventricular diastolic gallop along the left parasternal border may follow an acute embolism and may be persistent if heart failure results. The ventricular diastolic gallop frequently increases with inspiration, confirming its right ventricular origin. An atrial diastolic gallop is found with advanced right ventricular hypertrophy before heart failure has developed.

A variety of murmurs may be present: pulmonary ejection systolic murmurs, diastolic decrescendo (Graham Steell) murmurs of pulmonary insufficiency, pansystolic murmurs of tricuspid insufficiency, and systolic diastolic bruits over the peripheral lung fields produced by a partial obstruction of major pulmonary arteries.

Lungs: Examination may reveal a unilateral lag of thoracic expansion, dullness at the bases, localized superficial rales, or a friction rub. However, these signs may be absent, and the only abnormality found may be tachypnea.

Extremities: Pathologic studies demonstrate deep vein thrombosis in the lower extremities of 85 percent of patients with pulmonary embolism. Physical examination in many cases reveals no abnormalities, but skilled examination will often reveal signs of venous thrombosis that are of great diagnostic importance.

Unilateral edema of ankle or leg is usually the result of venous thrombosis. The swelling may be symmetrical, however, since thrombophlebitis is usually bilateral. If cardiac and renal causes can be excluded, bilateral lower limb edema should also raise suspicion of venous thrombosis.

Tenderness localized to the course of the veins in the thigh, tenderness on vigorous anteroposterior compression of the calf, and calf pain on forceful extension of the Achilles tendon (Homan's sign) are indicative of deep thrombophlebitis. It must be recognized that these signs are often absent and that pulmonary emboli often originate in thrombosed veins in which there has been little inflammation. Venous thrombosis is more often manifested by pain and tenderness in younger patients; in the elderly, symptoms and signs may be minimal. The inflammatory reaction and tenderness may become manifest hours or days later or may never appear.

Superficial varices are commonly the result of congenital inadequacy of venous valves, but varicosities may result from diversion of blood from throm-

bosed deep veins. Patients should be examined in an erect position to demonstrate varicosities. The only evidence of deep calf vein thrombosis may be diversion of blood to the anterior tibial veins (Pratt's sign).

Electrocardiogram. The electrocardiographic changes caused by pulmonary embolism have been discussed in detail. The general considerations to be emphasized are: The electrocardiogram is completely normal in 30 percent of cases, even with severe circulatory derangement. Following acute pulmonary embolus there may be a transient shift of the QRS axis to the right, with T-wave inversion, and transient peaking of the P waves. These findings may last for only a few hours but often last days to weeks. A common finding in older patients with associated coronary artery disease is an acute coronary ischemic pattern such as S-T segment depression and T-wave inversion in the precordial leads. In order to distinguish this from a purely arteriosclerotic ischemic process, attention should be paid to the QRS axis shifts. If the change is due to a pulmonary embolus the QRS axis will shift to the right. If the ischemic pattern is due to left ventricular disease the QRS axis usually shifts to the left as the patient's acute ST-T wave changes become manifest. It has been pointed out that if the limb leads suggest inferior infarction and the precordial leads suggest anteroseptal damage, the cause is probably pulmonary embolism.

Chest X-ray. Chest X-ray examination is abnormal in 70 percent of cases but the abnormalities are usually nonspecific ones of atelectasis, small pleural effusions, or diaphragmatic elevation. Differentiation of embolism, pneumonia, and atelectasis may be impossible on initial examination, but serial films may permit recognition of patterns characteristic of embolism: clearing with linear scars and transient engorgement of the pulmonary arterial trunks. In many cases of pulmonary embolism, in which the conventional chest roentgenogram appears normal, close inspection may reveal areas of hyperlucency due to diminished blood flow. The chest X-ray of advanced pulmonary hypertension due to small recurrent pulmonary emboli resembles that seen in severe mitral stenosis. The dilated pulmonary artery and enlarged right ventricle are common to both conditions.

Isotope scanning of the lungs. The recent development of tagged albumin aggregates of a size trapped in normal pulmonary capillaries provides a valuable method for recognizing avascular areas produced by pulmonary emboli. The value of lung scanning lies in its ability to demonstrate abnormal areas of de-

creased "uptake" in lungs which appear normal on conventional roentgenograms.

Though a single lung scan cannot distinguish avascularity due to embolism, neoplasm, or infection, serial scans of patients with pulmonary emboli, unlike the static pattern of infection and neoplasm, are characterized by changing patterns of uptake in areas of decreased vascularity. Pulmonary emboli are more likely to be multiple than neoplastic or infectious processes, and the demonstration of many areas of avascularity favors embolism. Serial scans may demonstrate changing patterns due to continued embolism. Clearing is gradual and return of the lung scan to normal may take many weeks.

Angiography. Demonstration of avascular areas by means of the lung scan ordinarily provides sufficient substantiation for the diagnosis of embolism. If the scan is not definitive or if embolectomy is being considered, angiography should be utilized. Dye injections from a catheter placed in the pulmonary outflow tract will delineate the major trunks and branches of the pulmonary vasculature and often demonstrate unequivocally a filling defect or "cutoff" at the site of obstruction. The angiogram may quickly return to normal or may remain abnormal for days or weeks.

Lively controversy is in progress between the advocates of lung scanning and those of angiography. One view is that the isotopic procedure is safer, more sensitive, and equally reliable. The other view is that scans are never specific, that angiograms are invariably required to confirm suspicions aroused by scanning. Actually, the two methods are complementary, scanning being preferable for demonstration of emboli occluding smaller arteries while angiography is more valuable for demonstration of larger emboli. It should be recognized that both methods are new, the changes are often equivocal, and much progress is to be anticipated in the interpretation of these studies.

Serum enzyme levels. Elevation of serum lactic dehydrogenase activity, elevation of the serum bilirubin, and normal serum glutamic oxalacetic transaminase activity form a triad which characteristically occurs as a result of pulmonary and circulatory changes produced by pulmonary embolism. However, there is considerable difference in experience regarding the diagnostic specificity of this triad. Amador and Potchen found LDH elevation in virtually all patients with embolism and absent in almost all patients without embolism. Levine and associates and Trujillo and coauthors, on the other hand, found these determinations to be of limited diagnostic value.

In spite of some shortcomings, radioactive lung

scanning, angiography, and LDH measurements provide diagnostic assistance that strongly supplements the methods previously available. Continued improvement in the accuracy of recognition of pulmonary embolism is to be anticipated as the newer techniques are refined and more widely applied.

The detection of thromboembolism would be futile if effective therapy were not available. Controlled studies in recent years have clearly established the efficacy of heparin and oral anticoagulants in prevention of recurrent pulmonary embolism. Plication of the vena cava has proved useful for prevention of

recurrence when anticoagulant treatment is contraindicated. Embolectomy represents an important advance for a small group of patients—those in shock following embolism and requiring vasopressor infusions for more than four hours. The treatment of thromboembolism, however, remains complex, tedious, and not without hazard. It is to be hoped that more widespread recognition of pulmonary embolism will spur new advances in diagnosis and in therapy of this important disorder.

(The references may be seen in the original article.)

LETHAL COMPLICATIONS OF THE EHLERS-DANLOS SYNDROME

P. Beighton, MRCP, MRCP ED, DCH, DTM & H, Brit Med J 3(5619):656-659, Sept 14, 1968, "by permission of the Author and Editor."*

Introduction

The main characteristics of the Ehlers-Danlos syndrome are hyperextensibility of the skin, hypermobility of the joints, and a tendency of the skin to split on minor trauma. The bony prominences are often covered with wide scars, and calcified spheroids may be palpated in the subcutaneous tissues. Musculoskeletal deformities are often encountered, and ocular, cardiovascular, and gastrointestinal abnormalities occur.

Though the Ehlers-Danlos syndrome is uncommon, several reports of death from arterial or gastrointestinal catastrophes have been published. McKusick (1966) postulated that the condition might be heterogeneous, and Barabas (1967) described three clinical types. The latter suggested that two of his patients had a form of the syndrome in which vascular accidents occurred with great frequency.

As the Ehlers-Danlos syndrome is familial, the identification of a lethal variety of it would be of great importance from the point of view of management and prognostication.

Recently 100 patients with Ehlers-Danlos syndrome have been examined, and information has been gathered concerning 40 others. The purpose of this paper is to describe the serious cardiovascular and gastrointestinal emergencies that occurred in these patients, and to correlate these events with the patient's clinical stigmata, in an attempt to delineate the group of subjects who are at risk. Comparison is made with all the similar case reports that could be found in the world literature.

Present Investigation

The 100 patients who were examined were members of 51 kindreds, and could be divided, on a basis of their clinical features, into five groups (Beighton, 1968). The majority did not experience serious disability, but a risk of cardiovascular or gastrointestinal accidents seemed to exist in patients with two particular types of the condition.

The first group had the gravis form of Ehlers-Danlos syndrome, while the second had the ecchymotic variety. These entities possibly correspond to the classical and arterial types described by Barabas (1967).

The gravis form of Ehlers-Danlos syndrome is typified by generalized joint hypermobility, gross skin hyperextensibility, and severe scarring. Orthopaedic complications, herniae, and varicose veins are frequently present, and many of these patients are born prematurely.

Thirty-two of those in the series had this type of Ehlers-Danlos syndrome, and several of them had experienced vascular trouble. Three had spent periods in hospital with huge haematomata which had occurred on minor trauma, while two had arterial bleeding after minor operations. Two other patients with vascular complications are described below (Cases I and II) to illustrate the characteristic features of the gravis form of Ehlers-Danlos syndrome.

The patients with the ecchymotic type have very different stigmata. Their bruising tendency is pronounced and skin splitting occurs, but joint hypermobility is limited to the digits, and the skin is not hyperextensible. Scars are usually atrophic and

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darkly pigmented. These patients seem to be particularly liable to vascular incidents. This variety of Ehlers-Danlos syndrome is uncommon, there being only four instances in the series, though a fifth (Case IV) was reported to me after her death. To illustrate this form of Ehlers-Danlos syndrome, two cases are described below (Nos. III and IV).

Gravis Type

Case I

This 29-year-old man collapsed with severe chest pain when the airliner in which he was travelling suddenly lost its pressurization. He remained unconscious for three days, but ultimately made a complete recovery. Chest x-ray examinations showed a widening of the ascending aorta. The finding of this abnormality, which had not been present previously, supported the diagnosis of dissection of the aorta. He had been born prematurely, and skin-splitting on minor trauma had always been troublesome. Frequent falls occurred in infancy, owing to unstable joints, and recurrent dislocation of the shoulder had eventually necessitated operation.

He was of slight stature, with many gaping scars on his forehead, elbows, and knees. His skin was hyperextensible, and he had marked generalized joint hypermobility. His ears were low-set, his nose was crooked, and epicanthic folds were present. He had prominent varicose veins, and there was a considerable degree of static pes planus.

His parents and siblings were all normal, but his daughter, who had been born prematurely, had similar stigmata.

Case II

This 36-year-old storeman was admitted to hospital with a painful swelling in the thigh which had occurred in the absence of any precipitating factor. A diagnosis of bleeding due to arterial tear was made, and as he was known to have the Ehlers-Danlos syndrome, operation was considered to be inadvisable. He was treated with blood transfusion, and made a satisfactory recovery.

He had been born prematurely, and had always experienced bruising and skin-splitting on minor trauma. Orthopaedic treatment had been required for sprains of his ankles and knees, and he had skin-grafting to both elbows. Closure of lacerations had been difficult because of the tendency of stitches to tear out of the skin, and a surgeon had told him that "suturing his skin was like sewing cold porridge."

He was of average height, but very thin, with hardly any subcutaneous fat. There was pronounced

hyperextensibility of the skin, which on release sprang back to its former position. All the joints were hypermobile, and the bony prominences were covered with wide scars. Thoracolumbar kyphoscoliosis was present, and the thorax was asymmetrical.

His parents and relatives were unaffected, and he had neither siblings nor children.

Ecchymotic Type

Case III

This 53-year-old housewife's life had been overshadowed by episodes of bleeding. The slightest trauma caused massive ecchymoses, and even housework led to bruising of the fingers. Spontaneous haematomata occurred in the muscles, and nose bleeds and menorrhagia had been features of her youth. Tooth extraction had been followed by haemorrhage which had necessitated suturing of the gums, and haemoptysis occurred during exacerbation of her chronic bronchitis.

Owing to her small stature her two children had been delivered by caesarean section. Both of these operations were complicated by heavy bleeding. On the second occasion she was unconscious for five days after the operation, and this episode was followed by a transient left hemiplegia. Appendicectomy and repair of a strangulated inguinal hernia were made difficult by the friability of the tissues, and bleeding and wound dehiscence occurred eight days after the former operation.

She was only 4 ft. 10 in. (147 cm.) tall, but her bodily proportions were normal. Her skin was thin and fragile, and the bony prominences bore atrophic pigmented scars. The skin was not hyperextensible, and the joints were not hypermobile. Varicose veins were present, and the teeth were irregular, while a loud systolic murmur was heard in the aortic area.

Her father and a brother and a sister had similar stigmata, and they had all died suddenly. Her father died in the street from a massive haematemesis, while her brother's death had been due to a perforated bowel which occurred when he jumped off a chair and landed on his heels. Her sister died in her 'twenties from a "heart attack," which was possibly a dissection of the aorta. However, her other siblings, together with her sons and their offspring, were all normal.

Case IV

This 37-year-old housewife was awakened by a severe abdominal pain. Internal bleeding was diagnosed, and in spite of transfusion she died a few hours

later. Necropsy revealed a torn internal iliac artery and a retroperitoneal haematoma. She had previously spent a strenuous day playing with her children, but there were no other factors to account for the arterial lesion.

She had a lifelong tendency to spontaneous bruising, and her skin had been unusually fragile. Complete perineal tears had occurred at the deliveries of her two children, and she had had an operation to close a fistula between the right internal carotid artery and the cavernous sinus. The internal carotid was later ligated for recurrence of the fistula. Hysterotomy for termination of pregnancy was complicated by tissue friability and haemorrhage, and hysterectomy was performed. In the year preceding her death Ehlers-Danlos syndrome was diagnosed after a laparotomy for abdominal pain had revealed bleeding from dilated blood vessels in the abdominal wall.

The patient had been slim but of average height, and arachnodactyly was present. Her skin was unusually thin, and there were pigmented atrophic scars over her elbows. The skin was somewhat lax, but it did not spring back to take up its former position after it had been stretched. Joint hypermobility was present, but this was not a prominent feature.

She had no siblings, and neither her children nor her parents were affected by the condition.

Discussion

A review of the world literature revealed no fewer than 15 reports of death in the Ehlers-Danlos syndrome, and in many of these reports descriptions of the clinical stigmata were also given. Brief summaries of the salient features of these cases are given in the Table.

There have been several reports of vascular or gastrointestinal emergencies in patients who ultimately survived (Rybka and O'Hara, 1967; André *et al.*, 1965). However, a number of affected relatives of other patients have died from similar episodes (Jacobs, 1957; Barabas, 1967).

Including the present series, about 400 cases of Ehlers-Danlos syndrome have been reported. Over 20 of these patients died suddenly, and it is therefore apparent that patients with the syndrome are at a considerable risk. However, it is difficult to assess the magnitude of this risk, as obviously many uncomplicated cases remain undiagnosed or are never reported.

The patients in whom these events occurred appear to be of two distinct types, with recognizable clinical features. One group, with the gravis form,

typified by Cases I and II and Cases 3, 5, and 6 in the Table, had a marked degree of joint mobility, skin extensibility, and scarring, in addition to varicose veins and various musculoskeletal deformities.

The other group of patients, with the ecchymotic variety of the Ehlers-Danlos syndrome, had minimal skin extensibility and joint hypermobility, but had a marked bruising tendency. Cases III and IV had this form, and it is probable that Cases 1, 2, 9, and 14 in the Table were similarly affected.

Several other previously reported patients had arachnodactyly, shortness of stature, and tissue friability (Cases 4, 11, and 15). These patients might have had the ecchymotic type, but it is possible that they represent a further variety of the Ehlers-Danlos syndrome which has not yet been delineated.

Of the present series 32 had the gravis, while four had the ecchymotic form. It is likely, therefore, that the risks of arterial complications are of moderate degree in the former group, while in the latter group the risks are very high indeed. The high death rate of the ecchymotic patients probably explains the rarity of this type of Ehlers-Danlos syndrome.

The cause of these arterial episodes is unknown, but histological abnormalities in the walls of blood vessels have been reported to be present (Rubinstein and Cohen, 1964). It is possible that connective tissues which support the blood vessels may be abnormal, and in addition a coagulation defect may be present (Lisker *et al.*, 1960; Goodman *et al.*, 1962). The basic defect of the Ehlers-Danlos syndrome is still a matter for speculation, but an abnormality in the binding of the fibrils which make up the collagen bundles has been postulated (Jansen, 1955).

The delineation and recognition of these types of the Ehlers-Danlos syndrome are of importance from the point of view of prognosis, not only for the patient but also for the affected progeny. These forms of the condition are transmitted by the autosomal dominant mode of inheritance, and any child of an affected parent, irrespective of sex, is at a 50 percent risk of being affected. These facts have a bearing on genetic counseling and on the assessment of a patient for possible termination of pregnancy.

Summary

Death from arterial bleeding or gastrointestinal perforation has previously been reported in more than 15 patients with the Ehlers-Danlos syndrome. On the basis of 100 personally examined patients and a review of published accounts, these events seem particularly likely to occur in two distinct and recognizable forms (the gravis and the ecchymotic forms) of the syndrome.

Death in the Ehlers-Danlos Syndrome

| Case No. | Author | Age at Death | Sex | Cause of Death | Family History | Phenotypic Features |
|----------|--------------------------------|--------------|-----|---|---|---|
| 1 | Mories (1960) | 15 | M | Fell from bicycle. Haematoma in thigh. Death 18 days later from ruptured femoral artery | | Thin papery scars over patella. Hyperextensible fingers |
| 2 | Lapayowker (1960) | 35 | M | Acute regional enteritis diagnosed at laparotomy. Death postoperatively following wound dehiscence and gastrointestinal bleed | | Multiple "cigarette paper" scars. Moderate hyperextensibility of finger joints. Ecchymotic areas on feet |
| 3 | McFarland and Fuller (1964) | 12 | M | Death following a bleed into the popliteal space. Two similar previous bleeds | Elder brother and sister had loose skin and mobile joints | Many lacerations and dislocations. Multiple gaping scars over elbows and knees. Skin hyperextensible |
| 4 | McFarland and Fuller (1964) | 17 | M | Death from bleeding into superior mediastinum due to spontaneous rupture of right subclavian artery | Two normal sisters | Bruising and excessive bleeding from minor cuts. Scars over bony prominences. Hyperextensible joints. Possible arachnodactyly |
| 5 | Rubinstein and Cohen (1964) | 47 | F | Cerebrovascular accident due to carotid aneurysm. Death 3 days after craniotomy and ligation | Father and brother had loose joints, scars, and extensible skin. Her affected baby died at age 2 from "congenital cardiac lesion" | Gross generalized hypermobility. Marked skin extensibility and splitting, with multiple wide scars |
| 6 | Lynch <i>et al.</i> (1965) | 14 | M | Death from dissected aneurysm. Necropsy showed aortocaval and internal iliac arteriovenous aneurysms present | Father, three brothers, and one sister affected. Great variation in stigmata | Hypermobility joints, hyperelastic skin with a bruising tendency, and slow healing |
| 7 | Kashiwagi <i>et al.</i> (1965) | 64 | M | Death after repeated bleeding from colonic diverticula | | Hyperextensible fragile skin. Bruising tendency |
| 8 | Graf (1965) | 24 | F | Death from ruptured wall of left ventricle. Previous bleeds from carotid cavernous fistula. Necropsy showed multiple arterial aneurysms | Several members of family had bleeding tendency | Easy bruising. Bleeding from gastrointestinal, urinary, and respiratory tracts. Transparent extensible skin. Hypermobility fingers |
| 9 | Bannerman <i>et al.</i> (1967) | 43 | F | Death from ruptured splenic artery. Left common carotid ligated 5 years previously for a carotid aneurysm. Necropsy showed multiple aneurysms | Brother had spontaneous left carotid-cavernous fistula | Thin skin with prominent venous network. Skin not extensible. Joints not hypermobile |
| 10 | McKusick (1966) | 15 | M | Thrown to ground. Death from dissection of aorta | Mother died at age 22 from "internal haemorrhage of unknown aetiology" | Many scars. Cut easily and healed poorly |
| 11 | McKusick (1966) | 24 | M | Death from dissection of renal artery | | Short stature. Arachnodactyly. Easy bruising |
| 12 | McKusick (1966) | 14 | M | Death due to dissection of thoracic and abdominal aorta. Five previous episodes of spontaneous perforation of colon | | Numerous scars on knees and ankles |
| 13 | Schoolman and Kepes (1967) | 39 | F | Death due to tear of the ascending aorta during angiography to investigate a carotid-cavernous fistula. Previous spontaneous rupture of sigmoid colon | Mother died of cerebrovascular accident at age 33. Brother died of perforation of viscus. Daughter affected | Bruising tendency and hypermobile joints. Severe perineal tear at childbirth. Histology "typical of Ehlers-Danlos syndrome" |
| 14 | Barabas (1967) | 30 | F | Death due to spontaneous rupture of aorta. Previous haematoma in right iliac fossa and both popliteal fossae | No family history of Ehlers-Danlos syndrome | Severe bruising tendency. Skin transparent, with prominent venous network. Slight hyperextensibility of skin. Hypermobility limited to hands. Episodes of severe abdominal pain |
| 15 | Aldridge (1967) | 27 | F | Death from perforated sigmoid colon. Similar perforation 2 years previously | | Thin scars. Arachnodactyly. Spina bifida. Spondylololsthesis |

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(The figures and references may be seen in the original article.)

LEPROMATOUS LEPROSY: CASE PRESENTATION AND DISCUSSION

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Introduction

This case presentation is offered because leprosy in the United States is considered a rare disease. Since 1947 when I began practice, the only leprosy that I saw was at medical meetings and later at the several leprosariums visited during my military tour of duty at Tachikawa Air Base, Tokyo, Japan. It was not until 1965, almost 16 years later, that two cases were diagnosed in my own personal clinical practice (Colonel Hines) and both within a one-month period of time. The more interesting one of the two is presented here, that of lepromatous leprosy in a young male American citizen who was on duty in the United States Air Force at Travis Air Force Base, California, at the time the diagnosis was made. He had been in service 8½ months, but as his history will show, had early symptoms of his disease approximately two to three months before he entered the military, or almost a year before the clues were uncovered which led to the eventual diagnosis of leprosy.

Leprosy can occur at all ages, in both sexes and in every race. It can be found in any geographic area and can simulate many diseases, especially those affecting the skin. The lepromatous type indicates less host resistance than the tuberculoid type. Histopathologic examination of a properly stained specimen obtained by skin biopsy is the most important diagnostic procedure. Treatment consists of long-term chemotherapy with sulfone drugs.

Leprosy is, along with syphilis and tuberculosis, one of the "big three" granulomatous diseases. It is caused by *Mycobacterium leprae*, an acid-fast bacillus, and affects the skin, mucous membranes, nerves, eyes, and nearly all other organs and systems. While the organism has not been successfully cultured,

Shepard has demonstrated the multiplication of bacilli inoculated into the footpads of mice.

Two types of leprosy are recognized: the lepromatous and the tuberculoid. In addition, there is an indeterminate form which is usually benign, unstable, and found in early cases. Another form, which is called dimorphous or borderline, includes features of both the lepromatous type and the tuberculoid type.

The lepromatous type is characterized by a tendency to clinical progression and the presence of numerous bacilli. Both these characteristics are presumed to be evidence of a lack of resistance on the part of the host tissues. Skin, mucous membranes, eyes, peripheral nerves, and many internal organs are affected by the disease process. The lepromin test is negative. Histologic examination reveals a granuloma containing many large foam cells (Virchow cells) filled with bacilli. This granuloma is, in general, separated from the epidermis by a zone of normal connective tissue.

The tuberculoid type indicates high host resistance and shows a tendency to spontaneous regression. Only skin and peripheral nerves are involved. The lepromin test is positive. Histologically, a tuberculoid granuloma consisting of epithelioid cells and Langhans' giant cells is found in the corium, often toughening the epidermis. Bacilli are absent, or are present only in small numbers. While the tuberculoid granuloma itself is not diagnostic and may be confused with a sarcoid, a tuberculoid, or tuberculosis of the skin, the invariable selective involvement of cutaneous nerves established the correct diagnosis.

Leprosy can imitate many, if not all, diseases affecting the skin. In countries where it is encountered only infrequently, such as the United States, leprosy can be mistaken for another skin disease. Conversely, in countries with a high prevalence of leprosy, many other diseases that produce skin lesions are suspected of being leprosy. In the Leprosy Clinic

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The views expressed herein are those of the authors and do not necessarily reflect the views of the USAF or the Department of Defense.

at the United States Public Health Service Hospital, San Francisco, California, examples of both types of mistaken diagnoses have been encountered. The list of diseases incorrectly diagnosed, whether as leprosy or instead of leprosy, includes the following: drug eruption, erythema induratum, erythema nodosum, foreign body granuloma, granuloma annulare, ichthyosis, leishmaniasis, lichen planus, lupus erythematosus, lupus vulgaris, mycosis fungoides, neurofibromatosis, neurotic excoriations, pinta, psoriasis, reticulum cell lymphoma, sarcoidosis, seborrheic dermatitis, syphilis, syringomyelia, tinea, tuberculosis, urticaria and macules, especially hypopigmented macules. Reduction of sensation in an affected area can be of tremendous diagnostic help. However, apparent lack of such a disturbance does not necessarily rule out leprosy. Histopathologic examination of a biopsy specimen is essential for establishing or excluding the diagnosis.

Report of a Case

A 21-year-old white male was admitted 25 October 1965 to the United States Air Force Hospital Travis* from the outpatient clinic for evaluation of a bullous disorder of the fingers and a stuffy nose. Further investigation and treatment was indicated when a tentative diagnosis of Hansen's disease was made after histopathologic examination of biopsied skin lesions reported findings compatible with those seen in lepromatous leprosy.

The patient stated that approximately one year prior to admission he noted a stuffy nose. This was several months prior to his military service. He was seen in April 1965 at the outpatient clinic at Gunter Air Force Base, Alabama, for nasal symptoms. The findings were a crusted area in the nasal septum with a purulent discharge. Symptomatic treatment relieved the stuffiness. He was next seen for nasal symptoms in the outpatient otolaryngology clinic of USAF Hospital Travis in October 1965, approximately two weeks prior to admission. The otolaryngologist observed a nasal septal granulomatous lesion which he diagnosed as being infectious in origin.

Approximately two months before admission, the patient noted a blister on his fifth finger, right hand, not produced by trauma or thermal injury as far as he knew. The area was not painful and healed very slowly. He was previously seen in the outpatient dermatology clinic on 22 September 1965, where erythema, edema, and vesicle formation on the same finger was noted. There was also some erythema of

the hands and fingers generally. He was again treated symptomatically with topical medications.

On 30 September 1965, a slow healing ulcer with granulated tissue was noted on the fifth finger where the blister had been previously observed, and a relative reduction in sensation was noted in this area. Culture taken at this time grew out *Staphylococcus aureus*. This ulcer healed slowly with topical antibiotic ointment (Bacitracin**) and protective bandage.

He was again seen in the outpatient dermatology clinic on 18 October 1965 with several new vesicles on the right fifth finger. Biopsy was done at that time of a small blister on the fifth finger and a small nodule on the dorsum on the third finger. Histologic examination of the biopsy specimen revealed a subcutaneous granulomatous reaction throughout which had dispersed numerous acid-fast bacilli and which the pathologist felt was compatible with leprosy.

A tentative diagnosis of lepromatous leprosy was made and the patient was hospitalized for further evaluation.

Personal history revealed the patient had been in good health except for a periodic stuffy nose and recurrent blisters on his hands of approximately one year's duration. The patient was born on 2 August 1944 in Alameda, California, and 14 months later moved to Hawaii. Between the ages of 3 to 13, he lived on the islands of Guam, Yap, and Rota. Since he was 13, he had lived in the San Francisco, Eureka, and Yosemite areas, until about two years prior to induction into the United States Air Force when he lived in the Las Vegas, Nevada area.

The patient remembered that the family had had a native female housekeeper when he was four years of age, while living in the islands. At age ten, during the time they were living on the island of Yap, the family had both a native maid and houseboy. He recalled that he played regularly with the island native children and took part in the various activities of the group.

His father died of heart disease at age 56, when the patient was 17. The patient's stepfather was living and well at the age of 63. The patient had lived with him 12 years before he entered the service. The patient's mother was living and well at age 56. She had a history of some swelling in the legs at one time when she lived in Guam, but recovered and had no other problems. The patient had no brothers or sisters, and stated that he had no serious childhood or adult illnesses and no major surgery.

Physical Examination

The patient's height was 68½ inches; weight, 133

* Redesignated David Grant USAF Hospital, 1 July 1966.

** Bacitracin Ointment, Abbott Laboratories, North Chicago, Illinois.

pounds; pulse, 80; temperature, 98.6 F; blood pressure, 118/68 mm Hg. He was a well-developed, well-nourished white male, alert and cooperative. Examination of the head and neck was unremarkable except for questionable fullness and puffiness of the nose, cheeks, and ears, and dusky erythema around the eyes. There was injection of the bulbar and palpebral conjunctive. He had difficulty in breathing through his nose and a crusted area was noted on the left side of the nasal septum. There was palpable enlargement of the ulnar nerve above the elbows bilaterally. The most significant findings were confined to the skin, nasal mucosa, and lymph nodes. There was puffiness of the facies and ears, with dusky red erythema; dusky red discoloration of the fingers of the right hand; healing bulla of the fifth finger, right hand; a small ulcer, fourth finger, left hand; non-pitting edema of the legs and dorsa of the feet. Lymph nodes were palpable in each axilla with several larger ones of approximately 1 cm in the right axilla. There were also several non-tender 1 cm nodes on the inguinal area bilaterally.

Laboratory Data

On 26 October 1965, urinalysis was normal. White blood cell count was 6,000, with 37 percent neutrophils, 56 percent lymphocytes, 1 percent monocytes, 6 percent eosinophils; platelets were reported as adequate; sedimentation rate (corrected), 16 mm/hr; hematocrit, 43 percent. Serological test for syphilis (CLMF) was nonreactive. The biopsy of tissue from the third and fifth fingers of the right hand taken 18 October 1965 was reported as granulomatous reaction bilaterally, loaded with acid-fast bacilli and lipid histiocytes. A smear of serum from an incision on the left ear lobe taken 25 October 1965 was found to contain numerous acid-fast bacilli.

Hospital Course

Special consultation with Dr. Paul Fasal, United States Public Health Service Hospital, San Francisco, 28 October 1965, in part stated: "Correlating the clinical picture and the histological findings, the diagnosis of active lepromatous leprosy can be considered as established. I suggest hospitalization at the U.S. Public Health Service Hospital, San Francisco, for the time being."

The patient was then referred to the USPHSH on 28 October 1965 for further definitive treatment with the diagnosis of lepromatous leprosy and treatment was started with sulfonil dianiline (Dapsone*) 50 mgm a day.

On 5 January 1966, a telephone conversation with Dr. Levy, USPHSH, San Francisco, indicated that the patient was tolerating his treatment well and there was also clinical indication that the patient's disease process was showing some degree of control. Their repeated biopsies of the skin and nasal washings taken on several occasions at the USPHSH were all positive for Hansen's bacilli.

This patient had the lepromatous type of leprosy which means there were large numbers of bacillae in the cutaneous, subcutaneous tissues, and the mucous membranes of the nose. There was some nerve involvement as well. The period of treatment for this disease is prolonged and it can be expected that chemotherapy must be continued over many years.

The patient was medically discharged from the Air Force in January 1966 and has since been lost to our clinic but is receiving continued treatment at the U.S. Public Health Service Hospital in San Francisco.

Discussion

The exact method in which this patient's disease was contracted is unknown. It is quite probable, however, that the incubation period, from the time of the initial infection to the time of the first manifestations, was a period of years, most likely seven to ten years or more. It is therefore felt that this patient's disease was contracted sometime during the time he lived in the South Pacific islands, mainly because it is an endemic area.

Estimates of the number of cases of leprosy in the world vary considerably, but it is probable that at least 20,000,000 exist. The disease is extremely common in central Africa; high prevalences have been reported for China, India, and South America, and significant numbers in many other areas. The number of cases in the United States is estimated to be about 2,500 but, because of problems in diagnosis and the tendency for patients to conceal their identity, it is probable that the actual number is considerably higher. Of the known cases in the United States, the majority are in California, Texas, Louisiana, Florida, and Hawaii, but every section of the country has some.

The mode of transmission is not known with certainty. Many experts in leprosy believe that skin to skin contact with a bacteriologically positive patient is necessary; others believe that transmission via the respiratory tract is a distinct possibility. It is reasonable to assume that the degree of intimacy of the contact and its duration are important factors contributing to transmission of the disease. Of probable significance, however, is the fact that about 50 per-

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cent of the patients who have been admitted to the U.S. Public Health Service Hospital, Carville, Louisiana, gave no history of contact with leprosy. Many investigators in other areas of the world believe that a genetic factor exists which produces susceptibility to leprosy in a given person, but unfortunately no test exists to determine susceptibility. Epidemiologic efforts are concentrated on members of the patient's immediate family who have been exposed to the disease. The attack rate in these persons is thought to average about 5 percent in the United States. Figures from other areas of the world vary considerably.

The "incubation" or "latent" period of leprosy is quite variable, ranging from less than a year to many years, averaging probably three to five years. Because this interval is often prolonged, it is difficult to examine adequately the known contacts over periods of time necessary to determine the attack rates. In addition, the disease is erroneously considered by many persons, including medical personnel, to be an insignificant problem in the United States. This has resulted, not infrequently, in physicians not considering leprosy where such consideration was indicated.

The presenting complaint or finding will vary considerably depending on the type and duration of the disease, as well as the individual response to the presence of the invading organisms. The patient may seek medical aid following the appearance of skin lesions, particularly if they are numerous, erythematous, or painful, but anesthesia, or "numbness" as it is often referred to by the patient, frequently precedes the onset of these and other visible lesions by many months or years. Prior to a sensory deficit, hyperesthesia may be present. Characteristically, light touch and temperature appreciation are affected before superficial perception of pain. Deep sensation is usually intact. The sensory deficit due to leprosy may occur anywhere over the body, but initially is most likely to be found over an area of an extremity early in lepromatous or dimorphous leprosy, and over visible cutaneous lesions in tuberculoid leprosy. Contrary to the belief of some experts in the field, leprosy can cause pruritus, either as an isolated finding or associated with visible lesions. This symptom may be the initial one in some instances.

Erythema nodosum, the lesions of which are frequently associated with lepromatous leprosy, sometimes with dimorphous leprosy, but not with tuberculoid leprosy, may occur at any time during the course of the illness. These lesions may or may not occur during treatment; frequently, they occur following pregnancy or trauma of any type. Numerous

other precipitating causes have been suspected. During the course of erythema nodosum associated with leprosy, peripheral neuritis may develop as may many inflammatory changes in the eyes and orchitis. Necrotic ulceration of the skin, and occasionally of mucous membranes, often due to severe vasculitis, is not an uncommon problem.

Nasal congestion, epistaxis, and loss of eyebrows, eyelashes, and sometimes body hair are frequent complaints of patients with the disease. The scalp hair usually is unaffected in most cases seen in the United States, except that patients of Japanese and Korean extraction may exhibit scalp alopecia, often patchy in distribution.

Enlargement of lymph nodes is another sign, which can be early or late, and may be unassociated with any other sign or symptom. This may be localized or generalized, painful or not painful.

The importance of a careful history and physical examination is obvious. A history of or *the presence of anesthesia should be considered with suspicion*. Nerves should be palpated for enlargement and tenderness, and signs of ocular muscular weakness investigated. Deep tendon reflexes are usually not affected in leprosy.

Since the skin lesions of leprosy may be mistaken for other dermatologic conditions, the routine examination of biopsy material is strongly recommended. Biopsy should be made of visible lesions, but if none are present, biopsy of an anesthetic area may yield the diagnosis. Incisional scraping of the skin for acid-fast bacilli is at times a helpful screening procedure, though the presence or absence of organisms is not justification for making or excluding a diagnosis (this procedure should not be substituted for the biopsy). It should also be emphasized that the presence of acid-fast bacilli in nasal smears only is *not* of particular significance; conversely, the absence of bacilli on nasal scrapings does *not* rule out the diagnosis. Furthermore, it is extremely unlikely that *M. leprae* can be present in the nasal smears without obvious signs of the disease being present elsewhere.

The lepromin test is not a diagnostic test for leprosy. A strongly positive response to lepromin is found, characteristically, in tuberculoid leprosy; a negative response is the rule in lepromatous leprosy. It is variable in dimorphous leprosy but usually is not strongly positive or negative and in normal controls ranges from negative to strongly positive. The factors which govern these responses are unknown.

The lepromin test (also called the Mitsuda test) was first described by Mitsuda in 1919. It consists of the intradermal injection of 0.1 cc of lepromin (an

autoclaved suspension of human tissue containing lepra bacilli obtained from lepromatous nodes). In patients with tuberculoid leprosy, an indurated papule at least 6 mm in diameter will develop three weeks after the injection. The test does *not* produce reaction in patients with lepromatous leprosy. The lepromin test aids in determining the *type* of leprosy and this should be used only after the diagnosis has been established. It is of no value as a diagnostic test since it is not specific and can give a false positive reaction in a person who does not have leprosy.

Biologically false positive serologic tests for syphilis frequently are caused by leprosy, particularly by lepromatous leprosy. Cognizance of this fact and also that the *Treponema pallida* tests are negative in leprosy may prevent later embarrassment to the physician whose responsibility it is to determine the etiology of a positive serologic test for syphilis. It should be remembered however, that syphilis and leprosy can occur in the same patient.

Other tests which may be positive, particularly in lepromatous leprosy, are the rheumatoid factor, thyroglobulin antibody, and cryoprotein. As concerns dimorphous leprosy, these tests, including the VDRL, may be positive. The tests have been negative in patients with tuberculoid leprosy studied to date.

Studies continue to be performed in various areas of the world designed to provide information about the relative efficacy of prophylactic sulfone therapy and BCG vaccination as they relate to the prevention of leprosy. General agreement does not exist as yet—there are proponents for both methods. Studies to date and those in progress suggest strongly, however, that BCG vaccination (in tuberculin negative individuals with a negative lepromin test) may prevent leprosy from developing in presumably susceptible individuals; or, at least, should leprosy develop in such a vaccinated contact, the disease would more likely be of the tuberculoid type rather than of the lepromatous type. The administration of BCG has been reported to convert a negative lepromin reactor to a positive one. A number of experts in the field believe that persons with a positive lepromin test are much less likely to develop lepromatous leprosy than tuberculoid leprosy—should they develop the disease at all. Also, the possibility exists that persons with a positive lepromin test are, in general, less likely to develop any form of leprosy than are persons with a negative lepromin test, for reasons unknown.

Management

The most effective drug against the lepra bacillus is 4, 4'-diaminodiphenylsulfone (Dapsone; Avlosulfon). Many other sulfones, such as glucosulfone

sodium (promin) and sulfoxone sodium (Diasone), have been and still are used. Most of these, however, are finally converted in the body to diaminodiphenylsulfone. Treatment should be started with a small dose which is gradually increased to the optimal dose of 0.1 gm per day. Since no generally applicable formula exists, the treatment regimen will not be discussed here. It requires great caution and an individualization and should not be attempted by the physician who lacks experience with this disease. Treatment must be continued for many years and, after all active manifestations have subsided, the patient should still receive a maintenance dose. This applies to the lepromatous as well as the tuberculoid type although a much smaller dose is necessary in the latter. Since leprosy is a systemic disease, treatment cannot be confined to attacking the causative organism. It must also combat the damage to organs and systems. In addition to chemotherapy, therefore, treatment of eye and kidney complications, reconstructive surgery of mutilations of hands and feet, nerve transplants, and numerous rehabilitative measures may be necessary. Most cases of tuberculoid leprosy can be treated from the beginning on an ambulatory basis. However, great attention must be paid to all complications that can arise from nerve involvement. An ambulatory patient will have to be hospitalized for serious complications, such as severe lepra reaction, or for surgical correction of deformities. Patients with active lepromatous leprosy who are unable to support themselves and cannot live apart from small children should be hospitalized until the disease is rendered inactive. Cases of lepromatous leprosy in the continental United States should be admitted to the U.S. public health service hospitals which have facilities for evaluation and institution of treatment. If this is not possible, the evaluation and treatment should be carried out by physicians who have had experience with the disease. There are special clinics for leprosy in several states.

In addition to specific chemotherapy, other treatment programs are of great importance in the total management of the patient. Physical therapy can be of great benefit in preventing complications such as contractures and footdrop. Orthopedic consultation is indicated in these cases. In patients with nerve involvement, especially of the ulnar and peroneal nerves, surgical procedures can be performed that often result in a lessened incidence of muscle weakness, deformity, and trophic changes. One such procedure is transposition of the ulnar nerve. Close attention to eye problems has produced excellent results, and a reduction, if not complete eradication, of

blindness in treated cases. An important adjunct to the treatment of eye lesions in leprosy was the introduction of corticosteroids. These are most effective when used locally.

Supervised recreational activities, occupational therapy, and manual arts programs are important rehabilitative measures, as is spiritual guidance and the assistance offered by social service workers. An accredited school should be available for patients who need to continue their education.

Summary

A case of lepromatous leprosy has been presented and some of the essential features have been briefly

discussed. It is recommended that patients with newly diagnosed cases of leprosy and problem cases be hospitalized when feasible until such time that a satisfactory program of treatment is available at the U.S. public health service hospitals which care for leprosy patients.

Dr. Fasal's experience emphasizes that leprosy still affects a significant number of persons in the continental United States, that it occurs in members of any race, and that it is found in persons who have never been outside the country.

(The figures and references may be seen in the original article.)

RECENT ADVANCES IN THE MEDICAL AND SURGICAL TREATMENT OF HYPERTENSION

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Effective medical therapy for hypertension became generally available in 1950, and since then the overall mortality rate among treated groups has been lower than among the untreated. Although a cause-and-effect relationship between hypertension and myocardial infarction has not been established, in one large series the incidence of death due to cerebrovascular accident was reduced from 33 percent to 22.5 percent and the incidence of congestive heart failure reduced from 23 percent to 6 percent. In our opinion these statistics justify vigorous diagnostic efforts to find a surgically correctable cause for persistent diastolic hypertension—and if none is found, the application of an adequate program of medical therapy. The purpose of this paper is to outline the most recent advances in medical and surgical treatment for diastolic arterial hypertension. Although the exciting new frontiers in diagnosis are just as important, we shall not dwell on them, since they are the topic of another article in this issue.

Remediable Secondary Hypertension

There is nothing else quite so rewarding as the discovery of a disease-producing lesion for which there is a specific, curative surgical or medical procedure. Since the medical regimen prescribed in most cases of hypertension is palliative at best, we feel that the physician should be aware of all the types of hypertension for which there is therapy capable of producing completely normal blood pressure at all times, requiring the least medication or

—if a surgical procedure is advised—acceptable risk. The first portion of this paper presents current methods of treatment for these so-called secondary forms of hypertension.

Primary Aldosteronism

Although the patient with hypertension due to increased adrenal secretion of aldosterone may present with severe weakness, polyuria, and tetany, more commonly the evidence is only hypokalemia with or without systemic alkalosis. We have seen no patients with primary aldosteronism in whom the serum potassium was not low at some time. This situation is due to increased delivery of filtered sodium to the distal renal tubule, where potassium and hydrogen ions are excreted in exchange for sodium under the influence of aldosterone, with resultant reduction of total body potassium and alkalosis. Hypertension associated with an adrenal tumor that produces aldosterone and secretes it autonomously is thought to be due to expansion of the body sodium content. It is characteristic of primary aldosteronism that administration of thiazide diuretics does not reduce the blood pressure to normal, but this may result in an even more severe degree of hypokalemia and alkalosis. Ideally, the adrenal tumor or tumors responsible for this disorder should be sought out and removed when aldosteronism and suppression of plasma renin activity are detected.

But some patients, for various reasons, are not suitable candidates for surgery; however, it now appears that spironolactone (in doses up to 200 mg. per day) may correct not only the metabolic de-

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rangements but also the hypertension associated with primary aldosteronism. With this new mode of therapy, perhaps the indications for adrenalectomy in search of aldosterone-producing tumors 0.5 cm. or less in diameter may be restricted further, particularly when it seems possible that the search might require sacrifice of both adrenals. Bilateral adrenalectomy produces dependency upon exogenous adrenal corticosteroids and the danger of stress-induced addisonian crises—a high price, especially when medical therapy might effect satisfactory metabolic and blood-pressure control.

Hence it appears that spironolactone is specific therapy for hypertension due to primary hyperaldosteronism and also can be useful as preoperative preparation with restoration of depleted body potassium stores, when surgical exploration is elected. Moreover, its efficacy may be of diagnostic value when the physician finds hypokalemia and hypertension that respond completely to aldosterone-antagonist therapy.

Adrenal Hyperplasia

Adrenal hyperplasia may result in an excess of circulating cortisol, androgen, aldosterone or estrogen, producing a wide variety of clinical syndromes. Shepard and Clausen first recognized a peculiar variant of congenital adrenal hyperplasia in which progressive virilism was associated with hypertension. This condition was found to be due to partial deficiency of an enzyme responsible for steroid 11-hydroxylation, and consequently the production of cortisol was reduced and production of sodium-retaining steroids such as 11-deoxycorticosterone was excessive. Recently, a deficiency of adrenal 17- α -hydroxylase has been reported which mimics the metabolic and vascular manifestations of primary aldosteronism without virilism. In a variant described by others, the deficiency of 17- α -hydroxylase results in absence of urinary excretion of aldosterone, and feminization is lacking because of defective estrogen production. The hypertension of salt-retaining adrenal steroid excess may be completely reversed by physiologic doses of cortisol, which effects a feedback control that limits pituitary production of ACTH.

Pheochromocytoma

The pheochromocytoma is a tumor that actively secretes excessive quantities of epinephrine and norepinephrine and arises from chromaffin tissue, usually within the adrenal medulla but sometimes elsewhere in the abdomen or chest. It accounts for approximately 0.5 percent or less of all cases of

hypertension. Surgical excision is the treatment of choice. However, the operative and postoperative periods are fraught with wide fluctuations of arterial pressure. There is some controversy over the incidence of reduced plasma and blood volumes in the untreated patient preoperatively, but it is generally agreed that the treatment for postoperative hypotension should employ whole blood or plasma rather than vasopressors. Hypertensive crises during surgery can be avoided by preparing all surgical candidates with up to 100 mg. per day of phenoxybenzamine (Dibenzylamine), an alpha-adrenergic blocking agent which opposes the vasoconstricting effects of catecholamines. This drug may be used also as treatment for the 10 percent of all pheochromocytomas which cannot be removed surgically because of metastasis or patient debility.

A rare form of hypertension is due to compression of a renal artery by a pheochromocytoma. This is a situation for surgical treatment, with the usual preoperative and postoperative care as described above. Preoperative recognition of the dual cause is of utmost importance.

Renovascular Hypertension

The treatment of choice for hypertension associated with renal-artery stenosis is surgical when a functionally significant lesion has been confirmed by separated renal-function studies. However, one should consider the possibility that the kidney with the stenosed or more severely stenosed artery is potentially the better functioning one, and efforts should be made toward repair of the arterial lesion rather than nephrectomy. Among patients carefully selected for surgery, marked amelioration of hypertension may be achieved in 80 percent or more.

Medical management may be employed when the arterial lesion is so located that repair seems impossible, the stenosis not severe, the patient is elderly, or there is evidence of significant coronary or cerebral vascular disease which might make surgery intolerable. Normal blood pressures can be attained in more than two-thirds of patients treated with the usual combination of antihypertensive drugs. However, the physician must recognize that when renal-artery stenosis is severe, the restoration of normal blood pressure further diminishes renal blood flow and brings a risk of renal infarction. Even if blood pressure is controlled effectively by medical efforts, a decision against surgical intervention should be reconsidered if there is evidence of a loss of renal mass or diminution of renal function.

Renal Hypertension

Parenchymal renal lesions that cause hypertension are commonly bilateral. Even so, hypertension caused by some other renal and genitourinary disorders—dominantly unilateral atrophic pyelonephritis; obstructive uropathy due to prostatic hypertrophy, bladder tumor, or retroperitoneal fibrosis; ureteral occlusion from stone; or abdominal aortic aneurysms—may be markedly ameliorated by nephrectomy or relief of the obstructing lesion.

Therapy of hypertension due to parenchymatous renal disease must be individualized, though almost every patient requires some degree of sodium restriction. Care should be taken to avoid sodium depletion by excessively strict deprivation or injudicious use of diuretics, particularly in those patients with creatinine clearances of less than 30 percent of normal. If sodium depletion becomes marked, the patient's previously stable renal function may become unstable. Conversely, if sodium ingestion is not limited, edema and congestive heart failure may complicate the previously compensated state. Individualized care may also include eradication of urinary-tract infection, restriction of protein intake, and provision of fluid allowances adequate to permit a urinary volume of 2,000 ml. or more per day. Occasionally a patient undergoing chronic intermittent hemodialysis may require nephrectomy for control of hypertension, although excess of body sodium usually is the underlying cause.

Renin-Secreting Renal Tumor

Hypertension secondary to a renin-secreting renal tumor having the anatomic features of a hemangiopericytoma has been reported. Nephrectomy cured the hypertension, hypokalemia, and alkalosis. Extracts of the tumor incubated with human substrate produced a pressor substance resembling angiotensin, from which it was concluded that the tumor contained an excessive quantity of renin and so had been stimulating production of aldosterone by way of the intermediary angiotensin II. This condition probably does not account for a significant percentage of correctable hypertension.

Primary Hypertension and Uncorrectable Secondary Hypertension

Once the physician has decided that his patient has primary hypertension or secondary hypertension but is not suited to surgical treatment for it or advanced bilateral renal parenchymal disease with hypertension, he should teach the patient to measure and record his own blood pressure so that an appropriate plan of therapy may be formulated on the basis

of multiple blood-pressure recordings made in the patient's usual surroundings. This also enables the patient to participate in his own program to a greater degree and tends to minimize arbitrary discontinuation of therapy by the patient. Further, by revealing changes in the response to the usual drug dosage, it makes prompt counteraction possible. This is particularly important during use of the more potent drugs, such as guanethidine (Ismelin) and methyldopa (Aldomet).

Dietary Sodium Restriction

Prior to the discovery of the thiazide diuretics and ganglionic blockers, dietary sodium restriction was the primary mode of therapy for hypertension; but the rigid restriction required was unacceptable to most patients because of unpalatability. Unless the glomerular filtration rate is reduced to less than 30 percent of normal, however, some restriction of dietary sodium is necessary. Since the ordinary intake of sodium by the North American patient is usually greater than 150 mEq. per day, we instruct our hypertensive patients in a diet containing 90 mEq. of sodium or less as the cornerstone of medical antihypertensive therapy. Patients with parenchymal renal disease pose special problems because of their inability to compensate for the extremes of dietary sodium intake. Most patients with renal cysts or atrophy have a tendency to waste sodium to some degree when severely restricted, while those with glomerular lesions may have profound capacity to retain sodium. Therefore, the dietary sodium intake should be individualized for each patient who has hypertension associated with a decreased number of functioning nephrons, as we have mentioned earlier in this paper.

Thiazides

Orally administered thiazide diuretics rank second only to restriction of dietary sodium in their importance in the management of hypertension. Their ability to produce a decrease in blood pressure is not completely explained by the modest reduction in body sodium and water which results from initial diuresis and natriuresis. The hypotensive effect may be blunted by continued ingestion of large amounts of sodium. Used in optimal dosages, the several thiazide diuretics demonstrate no significant advantages over each other, as their modes of action are so nearly identical. The most troublesome side effects from use of these drugs are hyperglycemia, hypokalemia, and hyperuricemia with episodes of acute gouty arthritis. These possibilities necessitate cau-

tion in treating patients who have diabetes, gout, or known preexisting hypokalemia, all of which may be worsened. Less common side effects include maculopapular, petechial, and purpuric skin eruptions. Great caution should accompany the use of thiazide diuretics when the creatinine clearance is less than 50 percent of normal, and they probably should never be used when the creatinine clearance is less than 30 percent of normal.

Aldosterone-Blocking Diuretics

Spironolactone (Aldactone-A) and triamterene (Dyrenium) are diuretics which produce natriuresis without potassium-wasting. Their natriuretic effect is additive to that of thiazide diuretics, and their greatest value appears to be in combination with them. Not only is the requirement of thiazide diuretic reduced, but the tendency toward development of hypokalemia through renal potassium-wasting is lessened.

We ordinarily initiate therapy with the equivalent of 100 mg. of hydrochlorothiazide per day, or with 50 mg. of hydrochlorothiazide and 50 mg. of triamterene or spironolactone. On those uncommon occasions when the potassium-sparing diuretics are used alone, care should be taken to measure serum potassium frequently during the initial period of therapy so that serious hyperkalemia may be detected.

Furosemide and Ethacrynic Acid

Furosemide (Lasix) and ethacrynic acid (Edecrin) are extremely potent inhibitors of the reabsorption of filtered sodium chloride in the ascending loop of Henle and distal convoluted tubule. Losses of potassium may be great, and hyperuricemia is a regular feature in cases of prolonged daily administration. Usually the employment of these drugs for management of hypertension is brief or intermittent and intended to counteract marked excesses of extracellular volume which are not controlled with the usual program of sodium restriction and more conventional diuretics. The hypotensive effect of these two drugs probably is mediated in a manner similar to that of the thiazides.

Methyldopa (Aldomet)

When control of blood pressure by sodium restriction and diuretics alone is not satisfactory, addition of methyldopa often can bring a favorable blood-pressure response with few adverse side effects. The hypotensive action of methyldopa is poorly understood but seems unrelated to its ability to inhibit the synthesis of norepinephrine and epi-

nephrine precursors. More likely is the theory that false sympathetic transmitters containing methyl-dopa mimic norepinephrine and epinephrine in the peripheral adrenergic neurons. The ultimate results are decreased peripheral vascular resistance and lower blood pressure, which is most marked in the erect position. Side effects include drowsiness, postural hypotension, arthralgias, myalgias, and grippe-like illness with fever, gastrointestinal symptoms, and mild reversible jaundice. A significant percentage of patients taking methyl-dopa develop a direct positive response to Coombs' test, though hemolytic anemia is almost never associated. This dose-related effect may interfere with cross-matching of blood.

It is appropriate to use this drug in cases of chronic renal insufficiency, as renal blood flow is unchanged or may be increased during its administration when satisfactory filtration is maintained. With reduced renal function, the drug tends to accumulate; and the dose should be adjusted frequently in the initial weeks of therapy. The patient should be encouraged to measure and record his own blood pressure twice daily in the seated and erect positions and to alter the dose of drug according to these readings, under the close supervision and instruction of his physician. As mentioned previously, this method minimizes complications of undetected hypotension and uncontrolled hypertension.

Methyldopa may be given in amounts up to 3 gm. per day orally in divided doses or, during acute hypertensive crises, 250 to 500 mg. intravenously every 6 hours; however, we rarely employ more than 1.5 gm. as a total daily dose, for side effects are much more common with larger dosage.

Hydralazine

Like methyldopa, hydralazine (Apresoline) may be added to thiazide diuretics and sodium restriction when blood-pressure control has not been adequate on that regimen alone. Its use is appropriate in cases of reduced renal function, as hydralazine does not significantly lower renal blood flow. However, unpleasant side reactions including headache and tachycardia are not uncommon. Also, a lupus-like syndrome may be associated with the use of hydralazine, especially in doses larger than 200 mg. per day.

Guanethidine

Similar disadvantages attach to use of guanethidine (Ismelin), a powerful antihypertensive drug with a rather high incidence of side effects, including ex-

ertional dizziness, muscular weakness, diarrhea, impotence, nasal stuffiness, blurred vision, and peptic ulcer. It is not unusual to see worsening of previously stable renal insufficiency when guanethidine is used in effective doses. Administration of guanethidine is contraindicated by significant coronary or cerebral insufficiency as well as by use of monoamine oxidase inhibitors.

It is our custom to employ guanethidine in the smallest effective dose, usually 10 to 25 mg., administered once daily, when satisfactory control of blood pressure cannot be attained by giving oral diuretics with or without methyldopa or hydralazine. Extreme care must be exercised in the use of guanethidine because the hypotension produced by this agent is more marked when the patient is erect, particularly in the morning or after exercise. We consider it essential that the patient carefully maintain his own blood-pressure record and observe for evidence of postural hypotension by measuring and recording blood pressures when seated and when erect, with the latter reading taken after a brief period of walking in place.

Guanethidine exerts its pharmacologic effect by depletion of tissue levels of norepinephrine, a neuronal transmitter, thereby producing temporary chemical sympathectomy.

Reserpine, Veratrum, Sedatives,
and Tranquilizers

Many physicians still employ reserpine, veratrum alkaloids, sedatives, and tranquilizers in the management of diastolic hypertension. We rarely use these preparations except as adjuncts, because none is significantly effective against persistent elevation of blood pressure and all produce side effects—including depressions, somnolence, and a potentiation of side effects from other, more effective agents—often enough to render their usefulness highly questionable.

Disorders Requiring Special Programs

Hypertension Associated
with Renal Insufficiency

The medical antihypertensive regimen becomes more difficult when renal functional impairment is of significant magnitude, as measured by a creatinine clearance less than 50 ml. per minute. Renal excretion of sodium is highly variable, and in some types of renal parenchymal disease, it may be directly related to the volume of urine excreted. If extracellular volume is depleted by excessively rigid

sodium restriction or injudicious use of thiazide diuretics (as mentioned previously in this paper), glomerular filtration and renal plasma flow will also decrease. This results in a worsening of the previously stable renal insufficiency. Depletion of sodium and reduction of extracellular volume are particularly prone to develop in patients who have polycystic renal disease and chronic pyelonephritis.

Nonetheless, appropriate sodium restriction is critical to the control of blood pressure, especially when thiazide diuretics and aldosterone antagonists cannot be employed. Our practice is to discontinue use of these diuretics or reduce it to an intermittent basis when the creatinine clearance is less than 30 ml. per minute. Sodium intake, restricted within the range of 20 to 90 mEq. per day, must be individualized to what the patient can tolerate without further lessening of glomerular filtration. Frequent determinations of the creatinine clearance and the 24-hour urinary excretion of sodium, preferably on an out-patient basis, are indispensable. When the usual program of sodium restriction and conventional diuretics has been ineffective and extracellular volume is greatly excessive, with edema and congestive heart failure, furosemide or ethacrynic acid may be used for brief periods.

Methyldopa and hydralazine have proved to be especially effective antihypertensive agents in cases of renal insufficiency, particularly as adjuncts to sodium restriction. Clearly, their therapeutic action is potentiated by sodium restriction. Since these drugs may accumulate in patients with renal insufficiency, thus augmenting their hypotensive effect, the dosage should be adjusted frequently in the initial weeks of therapy. In renal failure, guanethidine may be required occasionally to control severe hypertension. Great caution must be observed in using it, however, because of the probability of producing hypotensive reactions and aggravation of the renal functional impairment.

Toxemia of Pregnancy

It is not yet clear whether the prophylactic use of thiazide diuretics is effective for the prevention of eclampsia and preeclampsia in pregnant women. Recent studies have shown that once severe preeclampsia or eclampsia has occurred medical antihypertensive therapy tends to increase infant and maternal mortality and probably is advisable only when there is danger of a cerebrovascular accident. Induction of labor after the thirty-fourth week of pregnancy, in association with appropriate parenteral doses of magnesium sulfate, has produced the

lowest maternal mortality and the highest percentage of fetal salvage.

Summary

Advances in diagnostic methods and in surgical ability to effect marked amelioration or lasting relief of secondary hypertension warrant intensive study of virtually all patients with severe diastolic hypertension for evidence of a remediable lesion.

The development of new potent medical antihypertensive agents and the appropriate application of them has resulted in a profound diminution in the death rate from hypertension, particularly by lowering the incidence of cerebral vascular accident and congestive heart failure.

Most patients and many physicians do not appreciate the potential complications and the need for

close, prolonged supervision and continual vigilance to insure satisfactory medical antihypertensive therapy and prevent complications.

When a more potent antihypertensive agent, such as methyldopa or guanethidine is used, the patient should take the responsibility for measuring the blood pressure himself. Under close supervision of his physician, he should be allowed to vary the antihypertensive program according to twice-daily blood-pressure measurements.

Hypertension associated with or resulting from renal insufficiency requires special and particular attention to the avoidance of programs which may aggravate the renal problem.

(The references may be seen in the original article.)

CLINICAL OBSERVATIONS ON ADAPTATION TO ANTARCTIC LIFE

Robert B. Hunt, MD, Milit Med 133(8):625-628, August 1968.*

The International Geophysical Year was initiated in 1957. Since then over a dozen nations have been sending relatively large numbers of scientists and supporting personnel to Antarctica to build and operate stations and to conduct scientific projects. In 1965-66 the United States had approximately 1,000 men participating during the austral summer (October-February) and 280 during the austral winter (March-September). In spite of this international involvement in the South, there is little in the medical literature concerning the short-term adaptation of man to the rigors of this, the highest and coldest continent on earth.

This study was undertaken to determine whether changes of clinical importance occur during a year's sojourn in Antarctica, and to establish the normal range of adaptive response to the environment imposed by military assignment to this continent.

Byrd is America's largest inland antarctic station. It is located 80°S, 120°W on the Rockefeller Plateau, an icecap which rises 5,200 feet above sea level. The station consists of unattached buildings located within a series of interconnecting tunnels 10-30 feet beneath the snow surface. Electricity is supplied by diesel electric generators; the buildings are heated electrically and by diesel oil burners; water is supplied by melting snow.

Subjects in the study were military personnel resident at this station from October 1965 to October 1966. Over the winter the party consisted of 30 men—12 civilians engaged in research relating primarily to the physics of the upper atmosphere and 18 Navy personnel responsible for maintenance and operation of the station.

Living Conditions

During the austral summer, daylight was continuously present around-the-clock; working hours were long and physical labor arduous—12-14 hours per day with a half day per week of free time. When the station was closed to the outside world on February 25, 1966, working hours became shorter—approximately seven hours a day with week-ends essentially free.

Surface temperature outside the station ranged from +25°F. (austral summer) to -72°F. (August). Tunnel air temperature, which was determined by outside temperature, ranged from +10°F. to -60°F. This frigid air contained practically no moisture. Heat within the living spaces was controlled at 68°F. The length of time an individual spent outside the station each day largely depended on his work and varied with the time of year. A vehicle operator might spend 14 hours outside on a summer day, whereas the radioman seldom needed to venture out. During winter little time was spent outside the station.

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Food was both nutritious and palatable. During the austral summer fresh provisions were received periodically from New Zealand.

Description of Study

The subjects of the study consisted of the entire winter military complement except for the author. They ranged in age from 20 (DH) to 40 (WM) years, the average age being 29 years. Approximately three to eight months prior to the initiation of the study, each subject had undergone a thorough physical and psychiatric examination as a prerequisite to acceptance into Operation Deep Freeze. These screening examinations, which established the normalcy of the subject's record, serve as baselines for the investigation.

The study consisted of an initial clinical history and a monthly physical examination performed by the author. A monthly urinalysis, WBC count, hematocrit and differential blood count were also done. In the tenth month of the study (August 1966), a roentgenogram of the chest was made on each subject.

Results

Weight—Subjects were carefully weighed on a set of spring scales at the start of each examination. During the summer, 13 gained, one lost and two remained unchanged for an average gain of four and one-half pounds per person. During winter, four persons gained and 13 lost for an over-all loss of three pounds per person. Throughout the study, six subjects had a net loss, eight a net gain and three no change, an average net gain of one and one-half pounds per person.

HEENT—Hearing was tested by use of a watch held one inch from the ear. Four subjects fluctuated in their ability to hear the watch. Except for edematous nostrils at the time of upper respiratory tract infections and dry mucous membranes caused by dry antarctic air, no abnormalities were noted in the ears, nose or throat. Ophthalmological examinations, too, were normal.

Skin—No abnormalities were noted except for a general worsening of an acneiform rash on one subject (RH), which was probably aggravated by the restriction of personnel to one shower per week. More frequent bathing largely rectified the problem.

Reticuloendothelial System—Lymph nodes were not observed to change in size or number in any subject. There was no hepatosplenomegaly.

Cardiovascular System—Cardiac findings were remarkable in only three subjects. Two of these (BP,

AF) were noted to have Grade 1 precordial systolic murmurs in January and August, respectively. The third (DH) was found to have a Grade 1–2 soft, blowing systolic murmur over the apical portion of the heart; this persisted without change throughout the study. The latter subject had a history of having had rheumatic fever in childhood.

One subject (TH) was found to have an epigastric bruit on several occasions throughout the study; he remained normotensive and asymptomatic.

Peripheral pulses remained adequate in all subjects.

Blood pressures were recorded with subjects in the supine and sitting positions. Although 12 subjects exceeded a systolic pressure of 140 mm Hg and/or a diastolic of 90 on at least one occasion, no subject developed sustained systolic or diastolic hypertension.

Lungs, Abdomen, Genitourinary, Neurological Systems—No abnormalities were noted.

Psychiatric—The subjects adapted well to their new environment. Several pertinent factors might be mentioned. Each subject volunteered for Operation Deep Freeze. They were each carefully interviewed by a naval psychiatric team prior to being accepted. Each had a motive for going into the program—more common motives were to save money, to obtain first choice on next duty assignment and to have time to study for advancement in rating examinations. While at Byrd Station, a subject could usually contact his family every one to two weeks via "ham radio."

Routine and aggravating chores, such as washing dishes, were done by everyone in turn. An aggressive program of entertainment was carried out, including monthly parties, a weekly bingo night and a movie each evening. Chapel services were held weekly, a daily station newspaper was published, and the men actively participated in an intramural sports program. It was most important, however, that the subjects as well as the civilian scientists were extremely solid, stable individuals.

Laboratory—Hematocrits were elevated. The average of all subjects was 54 percent. The highest average of any subject was 57 percent and the lowest was 50 percent. The highest individual determinations were 62 percent (TH, AF, BP).

White blood cell counts were markedly elevated in one subject (HW), reaching 21,000 per cu. mm. with no apparent cause. This subject maintained a leukocytosis which averaged 13,900, whereas during the screening examination it had been 8,800 per cu. mm. Fourteen of the 17 subjects had at least one

monthly count which exceeded 10,000 per cu. mm. Only four of the 67 elevations could be explained on the basis of an infection or other illness. Differential counts were, in general, normal.

Urinalyses were interesting in that four subjects had +1 albuminuria, each on one occasion. The remainder of urinalyses were unremarkable. The average of each subject's specific gravities ranged from 1.011–1.022 with the majority being 1.018–1.022.

Roentgenograms of the chest taken during the tenth month of the study were compared with those taken during the screening examinations. No abnormalities of heart or lungs were noted with the exception of one subject (DM), who had a right hilar infiltrate; he was recovering from a pneumonitis and a follow-up roentgenogram revealed clearing of the infiltrate.

Discussion

No suitable explanation for the elevated hematocrits and white blood cell counts was apparent. It is well known that the hematocrit rises in direct proportion to increasing altitude. Because Byrd Station is situated in a meteorologically-determined low pressure area, its barometric pressure is equivalent to an altitude of 6,800 feet. On the basis of the known regression of hematocrit on altitude, one would expect the hematocrits to have averaged 50 percent rather than the observed 54 percent. Cold exposure, too, has been found to cause a rise in hematocrit. The reason for this discrepancy may lie in the combined effects of mild dehydration, cold stimulation and the response to high altitude.

Residence at high altitude is not associated with a leukocytosis. Infections and other illnesses could be considered the cause in only four of the 67 elevations. Mild dehydration may have been a factor in the elevated counts, but for the most part, the cause remains unknown.

No subject was found to develop sustained systolic or diastolic hypertension, cardiomegaly or pulmonary congestion. In contrast, Shastin noted the development of hypertension in three otherwise completely healthy persons residing at Mirnyy Station in the 1960–61 Soviet Antarctic Expedition.

Weight changes were remarkable in seasonal variation; that is, an overall gain in the summer season and loss in winter. This finding is in contrast to Wilson, who noted the reverse.

Upper respiratory tract infections were the most frequent cause of illness during the summer season.

This was perpetuated by the large influx of visitors, swelling the station population to as high as 96. The second most frequent cause was trauma, chiefly sprains, fractures and lacerations. With the onset of winter and isolation of personnel from the outside world, the number of upper respiratory tract infections fell to nearly zero. Trauma was then the leading cause of illness, but the number of cases dropped as men became more experienced. One scientist developed appendicitis in late winter. The author elected to treat him nonoperatively. He was evacuated on the tenth day of illness and subsequently underwent an elective appendectomy.

The United States Navy is to be congratulated on its selection of personnel and its superb predeployment training program for Operation Deep Freeze. The dangers commonly associated with Antarctica, such as snow blindness, frostbite, sunburn and psychiatric illness, consequently presented little problem.

Summary

Monthly physical examinations, laboratory studies and chest roentgenograms were performed on persons living in Antarctica in order to detect any clinical changes which may occur. Although the subjects remained in good health for the most part, significant elevations in white blood cell counts and hematocrits were noted. Hematocrit elevations were thought to be on basis of altitude and possibly mild dehydration and cold stimulation. The cause for white blood cell count elevations remains obscure, though mild dehydration could be a factor. That no person developed hypertension and that personnel in general lost weight during winter is in contrast with previous studies in Antarctica.

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(The figure and references may be seen in the original article.)

POVERTY OF FACIAL FUNCTION ASSOCIATED WITH BRAIN DAMAGE

A CLINICAL SIGN AND OBSTACLE TO NONVERBAL RELATIONSHIP

*Alfred S. Roberts, Jr., MD, Philadelphia, Arch Gen Psychiat 19(4):491-496,
October 1968.*

In the clinical evaluation and care of a group of brain-damaged subjects we have noted the failure of a significant number to mobilize facial movement adequately, and we suggest that this deficit may be used as an important clinical sign in the diagnosis of brain injury. Further, we have postulated from our observations that certain accompanying aberrant behavior often observed with brain-damaged individuals may be conceived as consequential to neuropathological interference with the motor aspects of nonverbal interaction; this interference, we suggest, particularly involves facial function, the central modality, in our view, of nonverbal interaction.

Description of the Disability

The disability varies from a nearly total immobility of facial expression to what seems best described as a failure to sustain expression sufficiently. With the latter, for instance, a smile, instead of being sustained for a period and then gradually changed to a neutral but alert expression, will quickly collapse and be replaced by a virtual absence of the tonus of facial musculature which normally expresses alertness or attention.

The impairment appears to involve particularly the musculature around the mouth, but may also include the muscles around the eyes and muscles of the forehead. There is often an asymmetry, with greater muscular excursion on one side than on the other. Quite notably most of these who show the deficit in other respects find it difficult or even impossible to whistle through their lips. Frequently along with impaired whistling ability there is a deficit in functioning of the circumocular muscles. This deficit may be demonstrated by having the subject alternately wink his eyes as fast as he is able. The process, if accomplished at all, is done with difficulty and is clearly slowed. Many of these children, at ages when it would normally be possible, cannot wink one eye but can only blink both eyes. Of course, allowance must be made for the fact that whistling and alternate winking of the eyes is often not learned well until late childhood and a deficit in these abilities can be the result of not having learned them. Flattening out of the nasolabial fold, often

more on one side than the other, is also observed, although more easily in adults than in children, since the nasolabial fold is less prominent in the latter. The loss of function may be sufficiently differentiated that the patient is able to smile and unable to frown. The reverse of this was not observed, perhaps because frowning is less easily initiated than smiling.

Demonstration of an unequivocal deficit in facial function through simple clinical observation is frequently difficult, although it is often so pronounced that once the examiner's attention is directed to it, its presence can hardly be doubted. With many cases, however, its clinical detection requires an awareness of the subject's failure to sustain adequate nonverbal contact through facial expression in his interaction with the examiner or with others with whom he may be relating. Observing the subject in the company of a sibling near his age and comparing facial function of one with the other may serve to make the deficit more evident.

Related Observations

Together with deficit in facial functioning we observed certain other forms of behavior which we presume to be significantly related to this deficit. Nearly one half of all of the children examined presented what has been designated by others as "hyperactive behavior." The syndrome has generally been considered to be associated with brain-damage and consists of restlessness amounting to a seeming pressure for motor activity, short attention span, temper tantrums, fighting, destructiveness, limitation of sleep time and labile emotionality. That the presence of this syndrome is importantly related to the presence of poverty of facial function as well as to other signs of organicity is more specifically documented below.

Most characteristically, it is our impression that the more marked the deficit in facial expression the more the child tends to avoid facial contact in interaction with others. As a rather notable example, one child would not only not look at the examiner, he would not even accept something to eat from him directly; rather, he eagerly accepted the tempting object when it was thrust toward him by the examiner who had his back toward the child and his face turned away.

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Other apparently substitutive forms of relating involving other parts of the body seem characteristic. For example, one child who presented an almost complete absence of facial expression, along with poor motor coordination in other respects, avoided facial contact or motions with parts of his body in making his wishes known. But when he wished to get onto the examiner's lap, he pushed backwards and upwards against him to communicate this wish. Relationship with him tended to be negotiated in terms of whole body movements. Another used his arms and whole head in expressing himself nonverbally. Another was often observed to attempt to manipulate the corners of his mouth with his finger, possibly to simulate a smile which he could not otherwise initiate.

Some children, moreover, seemed to develop special talents, possibly as substitutive modes of relating. For instance, the child who would not accept food from the examiner when directly facing him had taught himself to read with little or no help from his elders by age 5 with an IQ of 97. He read at a technical level of fourth grade although comprehending only at the first-grade level. He had accomplished this even though his parents were relatively nonliterate. Another boy, who also showed nearly complete absence of facial expression, was capable of similarly precocious reading.

Several subjects, including one of the children who read surprisingly well, showed either absent or impaired voice modulation, and their monotonous speech clearly resulted in a diminished capacity for expressing the nonverbal aspects of language. Although this limitation, too, seemed associated with facial deficit, it should of course be viewed as an adjunctive deficit rather than as secondary to facial impairment.

It is important also to note that relatively intensive stimulation would elicit adequate facial responses where usual, relatively nonintensive modes of relating with the patient would not. For instance, tickling generally stimulated laughing which could not be distinguished from that observed in children without facial deficit. This was particularly evident with one child showing facial expression characterized by an almost continuous stoney blankness who, under the intensive stimulation of attempting to bat a ball with vociferous encouragement on the part of the examiner, broke into a broad smile.

Specific Data

This study consisted of two phases. Nineteen children following clinically diagnosed cases of post-

infection encephalitis (N=15) and mumps encephalitis (N=4) were evaluated prospectively and 19 children and 1 adult in whom brain damage with or without earlier known illness or injury had been identified or suspected by the referring sources were evaluated retrospectively. The average age of the children at the time of the initial evaluation in the prospective group was 6.13 years and 8.87 years in the retrospective group. Only 2 of the 20 subjects in the retrospective group were female as distinct from a more nearly even distribution in terms of sex in the prospective group (11 male and 8 female).

The probability of the presence of organic damage to the central nervous system was rated on a 3-point scale (0 through 2) utilizing neurologic, psychological, psychiatric, and social service data as evidence with the heaviest weighting given to the neurologic evidence and progressively less weight given to the psychological, psychiatric, and social service evidence (factors 4, 3, 2, and 1 respectively). These scores are hereafter referred to as the *probability-severity ratings*. The maximum possible total score for each subject was 20. A score of 15 or more was considered to indicate the presence of severe brain damage. A score of 10 through 14 was considered sufficient to establish the clinical conclusion that debilitating organic damage to the central nervous system was present and at least of moderate severity. A score of 5 through 9 was considered sufficient for the presence of brain damage to be a significant probability and at least of mild severity.

A second scale was utilized to rate the degree of impairment of facial expression as determined from the records of the psychiatric examination. Ratings were divided into four categories ranging from 0 to 3 with number 3 representing the greatest degree of impairment.

Of nineteen children of the prospective group (postencephalitic), five showed probability-severity ratings of 10 or more and an additional seven showed ratings between 5 and 10.

Of the 20 cases in the retrospective group including one adult, ten showed probability-severity ratings of 10 or more and an additional four showed ratings between 5 and 10.

Only two subjects of the group of ten rated at 10 or more in the retrospective group had relatively clear-cut or highly probable causative events related to their central nervous system damage. These were viral encephalitis of an unidentified type and postvaccination encephalitis. Other cases included prenatal or birth injury (N=1), encephalitis associ-

ated with pneumonia (N=2), and carbon monoxide poisoning (N=1) as possible causes of brain damage. Four with ratings above 10 had no evident causative events which could be determined from the history.

Of the 38 children examined, 18 showed "hyperactive" behavior. Treatment of 12 of these with stimulant medications (dextroamphetamine or methylphenidate) resulted in improvement in general adjustment in eight and in no improvement or worsening of behavior in four.

Table 1.—Hyperactive Behavior Related to Other Organic Indices*

| Severity of Organic Indices (from probability-severity ratings) | Hyperactivity | |
|---|---------------|---------|
| | Absent | Present |
| None (0 to 5) | 11 | 2 |
| Mild (5 to 10) | 5 | 9 |
| Moderate (10 to 15) | 3 | 6 |
| Severe (15 through 20) | 1 | 1 |
| Total | 20 | 18 |

* Evidence of "Other Organic Indices" does not include ratings for "hyperactive behavior" or for impairment of facial function. (Includes only children under 17 years of age.)

Table 1 relates the probability-severity ratings to the presence or absence of "hyperactivity" and shows a definite trend for hyperactive behavior to be associated with the presence of other evidence of organicity ($P = < 0.01$).

Table 2 relates the degree of facial deficit to the severity of organic indices and the presence or absence of hyperactivity for the total group. The data indicate that the presence of facial deficit is significantly related to the presence of other organic indications (not including hyperactive behavior) ($P = < 0.05^*$) and that it is also significantly related to the presence of hyperactive behavior ($P = < 0.05^*$).

Table 2 also indicates that facial deficit as a clin-

* Statistical probability of relationship here refers to the presence or absence of the factors and does not refer to their rated severity. For this analysis any rating of 5 or more on the probability-severity scale was considered to indicate the presence of brain damage and any rating of 1 or more on the facial expression scale was considered to indicate the presence of impaired facial function. The probabilities indicate relationship as determined from the data and do not represent tests for the validity of the observations.

Table 2.—Facial Deficit, Severity of Organic Indices, and Hyperactive Behavior

| Severity of Facial Deficit | Probability-Severity Rating of Organic Indices* | | | | Hyperactive Behavior† | | |
|-------------------------------|---|-------------------|------------------------|---------------------------|-----------------------|---------|-------|
| | None (0 to 5) | Mild (5 to 10) | Moderate (10 to 15) | Severe (15 through 20) | Absent | Present | Total |
| None (0) | 9 | 6 | 0 | 1 | 12 | 4 | 16 |
| Mild (1) | 3 | 2 | 3 | 0 | 3 | 5 | 8 |
| Moderate (2) | 1 | 1 | 2 | 4 | 3 | 5 | 8 |
| Severe (3) | 0 | 2 | 3 | 2 | 2 | 4 | 7 |
| Total | 13 | 11 | 8 | 7 | 20 | 18 | 39 |

* Does not include facial deficit or hyperactive behavior in scoring.

† Children under 17 only.

ical sign may be present when other evidence of organicity is slight or absent. Of 13 cases of the 39 showing probability-severity ratings from 0-5, four showed evidence of impairment of facial function; and of 11 cases showing probability-severity ratings of between 5 and 10, five showed evidence of facial impairment. The data does also indicate, however, that increased severity of brain-damage is more apt to be associated with impaired facial function since, of 15 subjects rated above 10, 14 showed facial deficit.

Comment

That his face is man's central organ of emotional expression is a view that is readily supported from everyday life experiences, as well as from some scientifically oriented inquiries. Of all animals, man has anatomically the most extensive development of facial musculature with the primates as a group relying most heavily on facial function as a facilitator of social interaction. In view of the apparent importance of the face, and of the published reports on nonverbal behavior including facial expression, it would seem surprising that the phenomenon of deficit in facial function as described has not previously become generally recognized. Perhaps we were able to identify it because we were oriented toward evaluating the patient as he functioned as a part of an interpersonal system rather than as an isolate functioning independent of his interpersonal or social milieu as tends to be characteristic of traditional medically oriented examinations. Whenever possible we asked the parents to bring the sibling nearest in age to the patient to interact with him during the psychiatric examination, and it was within this social setting in relating to one whose facial function was not impaired that his own limited facial response often became apparent.

In an attempt to further document our findings we have photographed a number of our subjects with still photographs and with motion pictures. Since

the difficulty is a matter of failure to initiate and sustain adequate movement relative to a given interpersonal situation, it did not seem possible to demonstrate this with single photographs. Motion pictures are effective but only when the deficit is marked or when the subject is photographed within the clear context of a social situation which is evident from the picture sequence itself. We are currently attempting to analyze facial deficit quantitatively in terms of interpersonal responsivity utilizing motion pictures.

The tendency of those who had more marked facial deficit to avoid facial contact with others may have been in part the child's response to our special interest in the functioning of his face, but we feel that more basically it was the result of his diminished ability to maintain effective interpersonal responsiveness in terms of facial expression. Sensing his inadequacy and the greater or lesser frustration that his failure created in others, the child avoided this mode of relationship as much as possible.

We have interpreted much of the unusual behavior of these children as attempts to compensate for failure to maintain adequate ego-sustaining nonverbal relationships through the usual nonverbal modes of interaction, i.e., facial expression and coordinated bodily movements, both major aspects of interpersonal relationship in the normally developing child. Thus, one child, discussed previously, with relatively immobile face used his arms and movements of his head rather than facial expression in order to express his feelings. Another, being poorly coordinated both in terms of facial function and in the movement of his extremities, substituted whole body movements as the next most available and effective mode of nonverbal interaction. The precocious reading of two of the most clearly brain-damaged children was thought to have probably occurred as a result of their attempt to compensate for their inability to maintain sufficiently fulfilling relationships through the usual modes of relating.

In the same sense we have viewed the "hyperactive behavior" of these children as an attempt to compensate for their failure to maintain adequate nonverbal relationships by making up through intensity and quantity of movement what they lack in skill, with hostility and aggressive behavior serving as a desperate means of breaking through the barrier which separates them from other people.

Although the phenomenon of deficit in facial expression was initially noted as a neurological sequela to postinfection encephalitis, it is evident from the retrospective data that it occurs with other forms of damage to the central nervous system. It should be

an especially useful sign at this time when we are coming to recognize the importance of minimal brain-damage as a concept in evaluating the problems of children in learning and behavior. Clearly further work must be done to define more completely its clinical and theoretical significance.

We see some of the issues in question to be as follows.

1. There is the difficulty that the developmental sequence of facial function in children has been only roughly outlined so that separating the abnormal from that which is within the normal range is frequently in doubt. It is our impression, however, that when the deficit is present it is characterized by a special quality which differentiates it from something which is simply less than that which would be expected.

2. It could be postulated that the deficit is secondary to failure of basic affective mechanisms which simply do not respond sufficiently or appropriately. That this is not the case is evidenced by the observation that there is usually a localization of the failure in function (asymmetry and circumoral as distinct from circumocular dysfunction) whereas if the problem derived from failure to initiate affect, the resultant deficit would be generalized. Further, it was often noted that the children expressed their feelings quite effectively by the use of head, hands, body, and voice, while maintaining relatively unchanging facial features indicating the presence of genuine emotionality.

3. Knowledge of the actual neurologic lesion or lesions remains speculative. The defect appears to resemble that observed in parkinsonism. However, again the lesion is more localized in its effect than with that disease. One adult patient not included in other data of this study, who presented impaired facial functioning very similar, if not identical, to that observed with the children, had received bilateral electrothalamectomy for relief of the gross bodily spasms of dystonia musculorum deformans. Whether the facial deficit here was due to the dystonia musculorum deformans or to the electrothalamectomy is not clear; however, in either case the similarity suggests that the neurologic lesion is extrapyramidal.

4. The importance of facial expression as a modality for initiating and maintaining interpersonal relations remains relatively unexplored. However, it seems probable that any very notable impairment would at least set a child apart from others as a result of his odd appearance and could very well be the basis of a serious breach in his psychosocial development. For instance, the child who cannot smile

probably will not be smiled at—at least not a second time. What happens to a child who is deprived of this basic, if not fundamental, reinforcing response from others? Do other interactional modes adequately compensate, or may not such a deficit place a child at a fairly fixed disadvantage in his interpersonal relationships, with consequent serious impairment of learning and personality development? Is not a child who cannot frown to give warning of a sense of anger toward those who are threatening him at a serious disadvantage in his interpersonal relationships?

5. If motor deficit of facial expression is a significant factor in the impairment of psychic maturation, should treatment be aimed at helping the patient compensate for this lack through retraining of the facial musculature and training in the use of compensatory modes of expression?

6. A corollary question relates to the fact that many hyperactive children are improved in their behavior when given stimulant medication as noted above. Is this improvement related to concomitant improvement in facial function and other nonverbal modes of interaction which may be viewed as consequential to the stimulating effect of the drug and consistent with our observation that facial expression became more adequate under conditions of more intensive environmental stimulation, (e.g., tickling or boisterous play)?

7. Since improved function appears to be associated with augmented stimulation (either chemical or environmental), it may be further surmised that the teaching of brain-damaged children may be facilitated by increasing the intensity of the significant stimuli presented to them. May it not then be that the current method of limiting distracting stimuli in the environment is effective, not because it counteracts the child's basic aberrant distractibility but because limiting irrelevant stimuli has the experienced effect of accentuating the relevant stimuli? In other words, the child perceives the significant signals as subjectively more intense when the background is muted.

Summary

On examination of 19 children following hospitalization for postinfection and mumps encephalitis and 19 children and one adult suspected of having brain-damage largely of uncertain or unknown cause, a significant number were observed to exhibit deficits in their ability to elicit and sustain facial expression.

The deficit varied from almost total failure to exhibit any facial expression to a simple lack of adequate tonus in facial musculature resulting in failure to sustain a given facial response adequately. Asymmetry of expression with persistently greater excursion of musculature on one side than the other was also frequently noted. Inability to whistle or alternately wink the eyes generally accompanied the impairment and was seen as a sufficiently constant finding to warrant its use as a clinical test providing allowance is made for age difference and environmentally determined variation in learning. The data support the contentions that deficit in facial expression is significantly related to other evidence of brain-damage and that hyperactive behavior is significantly related to both. It is postulated that hyperactive behavior, along with certain other aberrant forms of behavior observed by us, may constitute attempts of the individual to compensate for his inability to maintain adequate sustaining nonverbal interpersonal relationships through facial expression and to a lesser extent through other forms of motor interaction. It is further suggested that the paradoxical ameliorative effect of stimulant drugs on hyperactive behavior occurs as a result of improvement in the responsivity of the individual to his human environment by facilitating his capacity for nonverbal interaction.

Questions as to the basic neurologic deficit responsible for the impaired function and the possible significance of this impairment to psychosocial development and to the problems of rehabilitation and training are discussed.

This project was supported by funds from the Philadelphia General Hospital Research Fund and by the General Research Fund of the Pennsylvania Hospital. Facilities of both these institutions were utilized in this work.

Frank Ryan, MS, Priscilla Ekdahl, PhD, Louis Gromadski, MD, Jane Kohn, Abby Silverman, MSWC, and George Miller participated in the evaluation and care of patients included in this project.

Generic and Trade Names of Drugs

Dextroamphetamine—*Dexedrine*.

Methylphenidate—*Ritalin*.

(The references may be seen in the original article.)

PSEUDOHOOKWORM INFECTION — TRICHOSTRONGYLIASIS *

TREATMENT WITH THIABENDAZOLE

Edward K. Markell, PhD, MD, *New Eng J Med* 278(15):831-832, April 11, 1968.

Trichostrongylus infection, formerly rare in this country, is now encountered with some regularity. All cases are thought to have been introduced from other regions. Common in Korea and adjacent areas, as well as the Near East, these nematodes produce eggs easily confused with those of hookworms. Three cases recently seen (two in patients referred with a diagnosis of hookworm infection) are reported to call attention to this parasite, to describe the differences between its ova and those of hookworm and to document the efficacy of thiabendazole † in its treatment.

Case Reports

Case 1. A 23-year-old Korean-born woman, resident in the United States for a few months, was referred to this clinic for treatment of ascaris, trichuris and hookworm infections. A Stoll count indicated that the third parasite was actually trichostrongylus species. Egg counts per 24 hours were as follows: ascaris, 1,892,000; trichuris, 119,000; and trichostrongylus, 47,600. The patient received thiabendazole, 25 mg per kilogram of body weight, twice daily for 3 days. Anorexia, nausea, dizziness and anxiety during treatment were partly relieved by prochlorperazine (15 mg in sustained-release capsule). Several adult ascaris were passed during treatment. A stool concentrate 3 weeks later revealed a few trichuris ova; one 6 months later was negative.

Case 2. A 27-year-old Korean-born woman was referred here after treatment elsewhere for persistent infection with ascaris, trichuris, and hookworm. Stool concentrates demonstrated eggs of trichuris and trichostrongylus species in small numbers. Thiabendazole, 25 mg per kilogram of body weight, twice daily, was prescribed, but the patient discontinued the drug after 4 doses because of dizziness and weak-

ness, which thereupon promptly ceased. Stool concentrates 1 and 2 months after treatment were negative.

Case 3. A 21-year-old Iranian "picture bride" was seen because worm infection had been diagnosed in Iran. Stool examination revealed ova of trichuris and trichostrongylus species. Thiabendazole was given in the same dosage as to the preceding patients, with prochlorperazine, 15 mg, half an hour before the morning dose. Severe nausea and vomiting occurred but cleared promptly on cessation of medication. Stool concentrates were negative 1 and 2 months after treatment.

Discussion

Trichostrongyliasis is of minor importance in the United States. Light cases warrant no treatment. If treatment is indicated, it must be based on correct identification of the parasite since hookworm therapy, erroneously prescribed for this infection, is ineffective. Eggs of trichostrongylus, slightly pointed at one or both ends, range in length from 73 to 95 μ , and hookworm eggs, bluntly rounded, from 55 to 76 μ .

Treatment of these admittedly light infections was undertaken to assess the effectiveness of thiabendazole. Results corroborate similar trials in Brazil and Japan. A drug with common unpleasant, if not serious, side effects should be reserved for situations in which it possesses decided advantage. Although thiabendazole is effective against ascaris, enterobius, hookworm, trichuris, and strongyloides, drugs with milder side effects may be used for ascaris, enterobius and hookworm. For strongyloides and trichuris, however, the effective alternative is the highly toxic dithiazanine, now withdrawn from sale; for trichostrongylus, the only useful alternative is bephenium hydroxynaphthoate, which is not available in the United States.

(The figure and references may be seen in the original article.)

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† Kindly supplied as Mintezol by Dr. William E. Worley, of Merck Sharp and Dohme, West Point, Pennsylvania.

MEDICAL ABSTRACTS

MUNCHAUSEN'S SYNDROME

*P. Ireland, MD, J. D. Sapira, MD, and
B. Templeton, MD, Amer J Med
43(4):579-592, Oct 1967.*

A patient is described who, after eighteen days of hospitalization for unconsciousness, abdominal pain, hematuria, fever and a variety of other symptoms, was found to have Munchausen's syndrome; a documentation of seventy-two hospital visits and thirty-three police arrests is presented. The literature is reviewed with respect to the principal diagnostic criteria of the syndrome, and statistics are given regarding nationality, age, sex, documented hospitalizations, signs and symptoms of factitious illness, departure from the hospital against medical advice, and police records. Evidence in support of four possible underlying psychopathological entities—(1) antisocial behavior, (2) character neurosis, (3) brain damage and (4) a primitive, presuperego self-aggression—is presented, but the essential psychopathology remains to be elucidated. The importance of tolerance on the part of the physician and of an intensive therapeutic effort is emphasized.

GASTROINTESTINAL COMPLICATIONS IN BURNS

*CAPT T. D. Kirksey, MC USA, et. al.,
Amer J Surg 116(5):627-633, Nov 1968.*

Complications involving the gastrointestinal tract are commonly seen in thermal injuries and are present in a variety of forms. To date, 322 complications have been documented in 1,291 cases, an over-all incidence of 24.9 percent.

The paralytic ileus frequently accompanying burns requires nasogastric intubation. Esophageal stricture and erosion can result unless tubes are removed as soon as possible. Curling's ulceration of the stomach and duodenum is the most prevalent problem and is related to the magnitude of the burn and to a decrease in mucus production by the stomach. Ordinary therapeutic measures commonly used in the treatment of peptic ulcer have not been effective. Perforation and severe hemorrhage require hemigastrectomy and vagotomy; lesser procedures have not been effective. Nine cases of acute cholecystitis, seven occurring without the presence of calculi, have been seen. Cholecystectomy is the treatment of choice. Several cases of hemorrhagic pancreatitis have occurred, and at autopsy subclinical pancreatitis

is a frequent finding. Nonoperative treatment is recommended. Four cases of severe weight loss with duodenal obstruction by the superior mesenteric artery have been successfully managed by duodeno-jejunostomy. Involvement of the small and large intestine has been recorded in thirty-three instances and usually represents sequelae of low flow states or sepsis associated with thermal injury. Conventional treatment is effective.

The presence of a burn makes diagnosis more difficult, thereby delaying treatment. Thus, a keen awareness of the potential hazard of gastrointestinal complications after thermal injury is the key to successful management.

IMMUNOLOGIC FACTORS AND CLINICAL ACTIVITY IN SYSTEMIC LUPUS ERYTHEMATOSUS

*P. H. Schur, MD, and J. Sandson, MD,
New Eng J Med 278(10):533-538, Mar 7, 1968.*

To clarify the association between certain immunologic factors and clinical activity in patients with systemic lupus erythematosus, 96 patients were studied. Those with antibodies to deoxyribonucleic acid (DNA) or heat-denatured DNA, or with serum complement levels of less than 50 CH₅₀ units per ml, were more likely to have renal involvement. Very low complement levels and high titers of complement-fixing antibodies to DNA were always associated with active disease, especially active renal disease, whereas the absence of these abnormalities usually indicated inactive renal disease. A 50 percent fall in serum complement levels in 22 patients was accompanied by, or preceded the onset of, active nephritis in 19 patients. These serologic factors may thus reflect the in vivo formation of immune complexes that cause nephritis. Serial immunochemical observations may be useful in the management of patients with systemic lupus erythematosus.

PRIMARY AMYLOIDOSIS

*W. F. Barth, MD, et. al., Ann Intern Med
69(4):787-805, Oct 1968.*

Great progress has been made in defining the structure of amyloid. Further studies of the ultrastructure and composition of amyloid are described.

Clinical and immunochemical studies on 15 patients with primary amyloidosis are presented. These

studies do not support a direct relation between immunoglobulins, particularly Bence Jones proteins, and amyloidosis.

Low immunoglobulin levels in these patients were frequently noted and reflected decreased synthesis, urinary or gastrointestinal loss, or all of these.

Peripheral vascular blood flow was measured in several patients, two of whom suffered from intermittent claudication. Both of these patients had a decreased vasodilator response to ischemia and exercise apparently due to extensive vascular amyloid.

On the basis of studies presented and other recent studies, an alternate hypothesis for the pathogenesis of primary amyloidosis is presented.

ANATOMIC BASIS OF SURGICAL TREATMENT OF PARKINSON'S DISEASE

*J. B. Carman, MB ChB BMedSc DPhil,
New Eng J Med 279(17):919-930, Oct 24, 1968.*

The treatment of Parkinson's disease has been for many years the preserve of the physician. Now, however, surgical treatment, especially when used before the disease is clinically far advanced, is playing a greater part in bringing about sufficient remission of disabling symptoms, often for periods of years, to prolong the active and self-sufficient life of the patient.

The fundamental pathologic process, of unknown etiology, produces nerve-cell degeneration, principally in the globus pallidus and substantia nigra. Present treatments of the disease, whether medical or surgical, do not prevent this degeneration from progressing. They may so alter the state of balance of critical motor pathways concerned with the elaboration of activity at the periphery, however, that the deficit resulting from the underlying neuronal degeneration no longer interferes with motor activity to a disabling degree.

A striking feature of the surgical treatment of Parkinsonism has been the multiplicity of sites in the brain upon which attack has been made to relieve symptoms attributed to disorder of the classic "extrapyramidal" motor system. For instance, destruction of the deep cerebellar nuclei or undercutting of the cerebral motor cortex can effectively relieve a number of the symptoms. This has highlighted the essential unity and interdependence of the various motor systems—"pyramidal," "extrapyramidal" and "cerebellar"—and the finding that the thalamus is the site of choice for placing lesions to relieve symptoms not only of Parkinsonism but also of other diseases of spontaneous movement has called attention

to the relation of this center to the classic motor systems. Some of the implications of this relation are discussed in this review.

MECHANISMS OF GENESIS AND GROWTH OF CALCULI

*C. W. Vermeulen, MD, and E. S. Lyon, MD,
Amer J Med 45(5):684-692, Nov 1968.*

The purpose of this discussion is to examine some of the stone-forming mechanisms at the basic level. An attempt is made to consider three persistent root questions: (1) What is the physicochemical mechanism by which stone material is synthesized or put together? A concept employing crystallization principles was suggested as an appropriate alternative to the usual view, which assigns to stone matrix a crucial position in the stone process. (2) How and where do stones start in a structurally normal urinary tract despite the obvious inference that the stone embryo is very small and easily expelled? Here the peculiar significance of the renal papilla was emphasized. (3) What explanation can be offered to account for so-called idiopathic stone disease? An analogy with stone triggering experiments was explored and speculatively an explanation offered in which a short-lasting triggering episode sets off papillary embryogenesis. Thereafter the embryo continues to grow, even though the urine is no longer unusually propitious for crystallization. This concept emphasizes the significance of fluctuations in urine concentration in the causation of urolithiasis.

DETECTION OF THE ZOLLINGER-ELLISON SYNDROME: THE RADIOLOGIST'S RESPONSIBILITY

*F. F. Zboralske, MD, and J. R. Amberg, M.D.,
Amer J Roentgen 104(3):529-543, Nov 1968.*

The initial recognition of patients with the Zollinger-Ellison syndrome is primarily the responsibility of the radiologist. The pathophysiology of this syndrome leads to distinctive roentgenographic findings in the gastrointestinal tract. Although several reports have recorded some of the roentgenographic findings in this syndrome, none has adequately emphasized the prominent changes of the small bowel beyond the duodenal bulb. Despite previous hints of the importance of this pattern, its appreciation has not been continued. Two recent reviews of the roentgenographic features in these cases stated that a consistent or diagnostic small-bowel pattern was not observed. The authors' present

observations are at variance with such statements. The abnormal postbulbar and distal duodenum, the jejunum, and on occasion, the ileum, give the most informative roentgenographic evidence in the Zollinger-Ellison syndrome. It is the special attention to these areas that most often provides the key to the diagnosis. This report is based on the roentgenographic findings in 17 patients with the Zollinger-Ellison syndrome.

ABSORPTION AND EXCRETION OF LEAD IN GASOLINE BURNS

*M. Wood, MD, et al., Amer J Surg
116(5): 622-626, Nov 1968.*

Of 163 persons burned by flame, there was a greater mortality when injury was by gasoline flames (29 percent) than by nongasoline flames (16 percent). Urinary lead and coproporphyrins were measured in eighteen persons thermally burned by gasoline. The levels were elevated above the normal or safe limits in fourteen.

Gasoline, with tetraethyllead and tetramethyllead, contains a significant amount of lead. Absorption of lead is unlikely through the intestinal tract, possibly through the respiratory tract from combustion products, but most probably through the burned surface. Biopsy of the eschar indicated persistence of lead in the burned surface. This is a possible continuing source of absorption long after the initial exposure.

In the treatment of gasoline burns it is suggested that, with the finding of lead within the burn eschar initially and for many days after the burn occurred, early removal of the eschar would reduce the source of lead. The detriment of extensive debridement must be weighed against the potential hazard of lead, and excision will require sound clinical judgment. An increased lead excretion was observed when an increase in urinary volume occurred. It would be logical to assume that maintaining an adequate uri-

nary output would provide improved lead excretion.

Although acute lead absorption, poisoning, and encephalopathy are difficult to define, it is speculated that levels of lead higher than normal in the tissues and in the urine of a burned person may contribute to the morbidity and mortality.

Future investigative work should be done to corroborate or disprove these findings, and to establish acceptable experimental models.

CIRRHOSIS IN ALCOHOLICS

*C. M. Leevy, MD, Med Clin N
Amer 52(6):1445-1455, Nov 1968.*

Morbidity and mortality from cirrhosis in alcoholics has continued to increase during the past decade despite major advances in our knowledge of its pathogenesis and natural history. This is attributable to the increased incidence of alcoholism and failure to appropriately utilize available preventive and therapeutic measures. The occurrence of cirrhosis in alcoholics varies depending upon the amount, frequency, and type of alcoholic beverage ingested; dietary habits; and presence of other causes of hepatic injury. This condition is not progressive, and prognosis is good if alcohol intake is stopped before the development of evidence of liver failure. In contrast, once an alcoholic with cirrhosis develops ascites, bleeding esophageal varices, mental changes, or renal dysfunction, life expectancy is reduced and may not be altered by currently available symptomatic measures. A three-phase program which detects early phases of cirrhosis, provides treatment of acute symptoms due to hepatic and nutritional abnormalities, and initiates long-term medical and psychiatric care can significantly reduce morbidity and mortality resulting from alcoholism. Wide adoption of this or a similar model is needed. This paper reviews medical considerations upon which such programs should be based and extended.

HOSPITAL ADMINISTRATION SECTION

HOSPITAL ADMINISTRATION NOTES

Yours for the Asking: "Tips on Cleaning" issued periodically by the Industrial & Institutional Division of the Soap and Detergent Association, 485 Madison Avenue, New York, N.Y. 10022. A letter request will place you on their mailing list.

"Nutrition Notes" compiled by R. A. Seelig, United

Fresh Fruit & Vegetable Association, 777 14th St., N.W., Washington, D.C. 20005. Available at no charge.

Recommended Dietary Allowances: Seventh Revised Edition has been issued by the National Academy of Sciences. Developed by the Food and Nutrition

Board of the National Research Council. This guide presents, in tabular form, the daily nutrient intakes judged to be adequate for the maintenance of good nutrition in the general population of the U.S. Indicating that these nutrients can be obtained from many different combinations of food and in different patterns of food consumption, the new edition tabulates recommended allowances of calories and fifteen (15) nutrients for twenty-four (24) age categories of men, women, children and infants; other essential nutrients, not specifically tabulated, are considered in the text.

Federal Hospital Perishable Subsistence Guide, NavMed P-5106 has recently been printed and five (5) copies mailed to each naval hospital for use in subsistence procurement routine in the hospital food service program. The Interagency Committee on Food Items for Federal Hospitals is continuing to evaluate perishable subsistence items and will subsequently review nonperishables for standardization and inclusion in the guide.

IMPS: Institutional Meat Purchase Specifications prepared by the United States Department of Agriculture are available in Series: 100—Beef (20¢), 200—Lamb and Mutton (5¢), 300—Veal and Calf (10¢), 400—Pork (14¢), 500—Cured/smoked and fully cooked pork products (15¢), 800—Sausage Products (20¢), and 1,000—Portion Cut Meat Products (15¢) for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Recommend all food service officers to procure these excellent digests for use in preparing subsistence procurement documents.

LCDR Louis E. Pelletier, MSC USN, Naval Hospital, Portsmouth, Va., informs that carbonated beverage dispensers featuring cola, lo-cal lemon/lime, root beer, and non-cola drinks have been installed in dining rooms and expansion of sandwich bar to include hamburgers, hot dogs, french fries and baked beans has met with enthusiastic consumer acceptance.

LT Nicholas J. Clem, MSC USN, Naval Hospital, Memphis, Tenn., has established an Enlisted Food Service Committee to advise on dining room patrons' likes and dislikes and to suggest methods for improving food and service. *CDR Harold J. Janson, MSC USN*, presently Naval Hospital, Bethesda, Md., informs that this system was very effective and was coordinated through the existing Leadership Council at Naval Hospital, Portsmouth, Va.

Recommended Reading:

"Food as Therapy," Editorial by Marvin Spritzler, *Hospital & Nursing Home Food Management*, Nov 1968, page 27.

"Food-Borne Diseases: Part I by Prof. Lendal H. Kotschevar, Michigan State University, *Hospital & Nursing Home Food Management*, Nov 1968, pages 12 and 48. Part II is on page 6 of the Dec 1968 issue, same publication.

"Dietary Fat and Human Health," *National Academy of Science Publication* 1147, 1966, (VI) +52 pages, paper, (\$1.50).

"Wholesome Meat Act. . . . What it Means to the Food Service Operator," by C. F. Diehl, USDA, in *VEND*, 1968-1969 *Food Service Business Handbook*, Dec 1, 1968—Section 2, pages 20 and 21.

"Roundtable" panel discussion by faculty members of the School of Hotel Administration, Cornell University in the *Hotel and Restaurant Administration Quarterly*, Nov 1968, Vol 9, No 3, pages 2, 3, 4 and 60.

"Special Report: Convenience Foods—The Operator Speaks," an exclusive study by Volume Feeding Management staff members to aid in evaluating the potential of these items in *Volume Feeding Management*, Oct 1968, pages 35-58.

Ration Data. Ration statistics for the total hospital food service program in the First Quarter, FY 1969 are as follows: (Source—Food Service Performance Analysis reports, NavMed 1412)

| | |
|---------------------------------------|----------------|
| Total rations served | 1,465,112 |
| Total cost of provisions | \$1,891,040.84 |
| Average cost of ration | |
| (raw food or net cost) | \$1.291 |
| Average cost of whole, | |
| fresh milk/gallon | \$0.78 |
| Average ounces served whole, | |
| fresh milk/ration | 27.4 |
| Percentage of Total Expenditures for: | |
| Meat, fish and poultry | 38% |
| Whole, fresh milk | 13% |
| All other categories | 49% |

Average Rations cost for Hospitals by group:

| | |
|-------------------------------|---------|
| Group A (CONUS) | |
| 85,000 to 209,500 rations/qtr | \$1.273 |
| Group B (CONUS) | |
| 34,900 to 51,900 rations/qtr | \$1.274 |
| Group C (CONUS) | |
| 9,500 to 32,000 rations/qtr | \$1.318 |

| | |
|--|---------|
| Group D (OCONUS) | |
| 2,800 to 24,500 rations/qtr | \$1.372 |
| Average % of attached inpatients served | 75% |
| Average % of attached staff/support personnel served | 53% |

| | |
|---|------|
| Average % of modified diets to total inpatients served | 18% |
| Average of total expenditures for supplemental nourishments | 1.5% |

SUBMARINE MEDICINE SECTION

NAVY PERSONNEL IN "DIVE" TO 1,000 FEET AT DUKE UNIVERSITY

As a leader in the field of bio-medical investigations in hyperbaric medicine and high pressure chamber excursions, Duke University recently enlisted the assistance of the Navy's Experimental Diving Unit (Washington, D.C.) in conducting the first full scale diving excursion to 1,000 feet outside of Navy facilities.

On 2 December 1968, a team of five men, including two Navy divers and a Navy medical officer, entered the high-pressure chamber complex at Duke to commence a dramatic and significant experiment in man's continuing efforts at adapting himself to the environment of deep-ocean exploration. Breathing a precisely mixed atmosphere of helium, oxygen and nitrogen, the team began its descent, arriving on the "bottom" at 1,000 feet some twenty-four (24) hours later. Within about twelve (12) hours on the "bottom," the bodies of the five men had acquired a state of total saturation by the gas mixture. The team spent a total of 77½ hours on the "bottom" conducting various work tasks and testing new diving equipment that ultimately demonstrated its accept-

ability through performance at that depth. Meanwhile, the men were acting as subjects in numerous bio-medical tests and observations carried out by the attending physician, LCDR James S. Kelley, MC USN, in the chamber, and LCDR James K. Summitt, MC USN, who was the principal investigator on the "surface."

On 6 December, with the work/test phase completed, the team began its long period of decompression which embraced additional bio-medical observations. The decompression and return to the surface was an arduous and exacting schedule that required more than 280 hours, or nearly twelve days for completion; the time calculated to return the team to the surface, each man with total recovery and absence of all after-effects.

The dive had been so well planned that only minor adjustments were necessary in bottom and decompression schedules.

The Duke dive succeeded in establishing that man, in fact, is physiologically capable of not only enduring, but of functioning actively and recovering totally from prolonged exposure to pressures at this simulated depth.

DENTAL SECTION

THE USE OF THE MILLIPORE FILTER IN REGENERATION OF THE FACIAL NERVE IN DOGS

LCDR B. J. DeVos, DC USN, and
LCDR R. E. Hillenbrand, DC USN.

The goal of surgical repair is complete regeneration of injured nerves with return of function. At present, direct primary suturing of severed nerve segments is widely used clinically to achieve this goal, but the Millipore filter offers a possible alter-

native to this technique. This investigation was undertaken to study the effects of Millipore filter on facial nerve regeneration across a 1-cm gap. Bilateral transection of the inferior labial branch of this nerve was performed on three adult mongrel dogs. On the control side of each animal, the proximal and distal stumps of the severed nerve were sutured to fascia 1 cm apart and the wound was closed. On the experimental side, the proximal and distal nerve stumps were sutured 1 cm apart into the ends of a Millipore filter tube 3 mm in diameter with a pore size of 0.4 micron. The tube was then se-

The opinions and assertions contained herein are those of the authors and are not to be construed as reflecting the views of the Navy Department or the naval service at large.

cured to the fascia and the wound was closed. Postoperatively and every 4 weeks, the nerves were electrically stimulated through the skin to test for regeneration. Although these tests failed to produce any electrical conduction, direct stimulation of the nerves just before the dogs were sacrificed (17, 19, and 22 weeks postoperatively) indicated that regeneration had occurred. Macroscopically, regenerated tissue on the control side had the appearance of gross neuroma in all three cases, while regenerated nerves protected by Millipore filter tubes had a normal appearance. Histological examination revealed axons crossing the 1-cm gap on both sides in all dogs. Millipore-protected tissue was more orderly than unprotected tissue, axons and axon sprouts were more numerous, connective tissue was less dense and mature, and there was less mucoid exudate. Electron photomicrographs showed that axons in the unprotected tissue exhibited degenerative changes in the axoplasm, while axons in the Millipore-protected tissue showed normal axoplasm with distinct neural fibrils. It was concluded that the Millipore filter, by excluding scar tissue, can provide an unobstructed path across a gap through which a regenerating nerve can grow in an orderly manner.

(Abstract by Research Work unit: MR005.19—6052 by LCDR B. J. DeVos, DC USN, and LCDR R. E. Hillenbrand, DC USN.)

EVALUATION OF INSTRUCTIONAL PROCEDURES FOR PROMOTING BETTER ORAL HEALTH

LCDR M. O. Brose, DC USN.

The purpose of this study was to evaluate the effectiveness of two different instructional techniques in terms of the retention of dental information and improvement in oral health. Eighty-two high school students and naval officers were randomly divided into three groups, of which the first received individual instruction, the second received group instruction, and the third (control) received no instruction. Instruction consisted of an oral presentation, with points made in the lecture reinforced by 10 colored slides. A written test, consisting of 17 short answer questions, was devised to reveal elementary dental knowledge. All subjects completed this test prior to instruction and again 4 and 6 months following instruction. Test scores prior to instruction were high (13.8 ± 1.8). Initial and subsequent test scores revealed no significant difference between any of the groups either in initial dental knowledge or in retained knowledge acquired in a single lec-

ture. A simplified Oral Hygiene Index (OHI) score was obtained for each participant at the beginning of the study and again at its conclusion. There was some improvement in the OHI scores on all groups, but results were inconclusive as to the effect of instruction. It was concluded that the average individual with a high school education already has considerable elementary dental knowledge and that neither the extent nor the application of this knowledge can be improved by a single lecture, whether heard individually or as a member of a group.

(Abstract by Research Work Unit: MR005.19—6052 by LCDR M. O. Brose, DC USN.)

The opinions and assertions contained herein are those of the authors and are not to be construed as reflecting the views of the Navy Department or the naval service at large.

PERIODONTAL PREPARATION FOR FIXED PARTIAL DENTURES

CAPT P. F. Fedi, DC USN, and CDR E. P. Klecinic, DC USN, J Prost Dent 20(6):511-516, Dec 1968.

Ten logical steps for the successful treatment of patients needing fixed partial dentures are pointed out. Many of these steps apply equally well to all the restorative disciplines in dentistry. If the abutment and remaining teeth are not brought and kept in a healthy condition, the restorations then cannot be considered successful. Preservation and restoration should be based on biomechanical principles correlated with histopathologic concepts and sound clinical judgment. The authors intend for the treatment of the total dental disease spectrum found in each oral cavity. The ten steps that can be taken to restore and preserve the periodontium are as follows:

(1) Eliminate all irritants. The primary etiogenic agent in all dental diseases is bacterial plaque and plaque control is the key to successful prevention of these diseases in the stage of prepathogenesis.

(2) Eliminate all periodontal pathosis. When periodontal pockets are eliminated, the gingival margins become free to assume a stable position and the normal crevice then becomes readily accessible to home oral physiotherapy procedures.

(3) Correct gingival deformities. Creating physiologic gingival contour is essential for proper pontic and crown design.

(4) Move malposed teeth. Minor orthodontics oftentimes creates a healthy environment and may help achieve esthetics, parallelism of abutment teeth and create space for proper pontic placement.

(5) Remove occlusal interferences. The establishment of a healthy functioning, stomatognathic

system with harmony among the temporomandibular joints, muscles of mastication and the teeth, is the grand goal of all dentistry.

(6) Correct tooth deformities. Correcting tooth deformities by odontoplasty or by restorations helps create proper contours.

(7) Splint mobile teeth. Splints may be used as a diagnostic aid or may be an integral part of the permanent restoration.

(8) Teach and motivate the patient to perform home oral physiotherapy. Success in motivation can be accomplished using a five-step program.

(9) Treat carious lesions and replace missing teeth. This step is always preceded by the previous eight steps.

(10) Educate the patient in the importance of recall maintenance. Complete restoration of the oral cavity does not end the dentist's obligation to the patient. The patient must be recalled periodically for thorough and complete examination to rectify any incipient lesion.

(Abstracted by CAPT A. K. Kaires, DC USN.)

PLAQUE MICROBIOLOGY AND CARIES

*Robert J. Fitzgerald, Dent
Abs 13(12):743, Dec 1968.*

Dental plaque is not a single entity. Plaques may be characterized by their metabolic activities, their chemical composition, and their pathogenic effects. Some plaques are associated with caries, others with periodontal disease, and others with calculus formation. Eventually, as more information becomes available and new techniques are developed, it should be possible to characterize each type of plaque by its microbial composition. The fluorescent antibody technique seems to offer considerable promise in achieving this end.

One feature which seems to characterize all plaques is that of adhesion to the tooth surface. Elucidation of the mechanism of this common phenomenon is one of the major challenges of dental research.

Much research has been directed to the study of specific plaque microorganisms which have been shown to be cariogenic in animal test systems, and in particular the streptococci which produce extracellular slimes of the dextran type from sucrose. These slimes are now considered to be a factor in the formation and adhesion of plaque to the tooth surface. This hypothesis has been verified in the case of hamsters infected with these streptococci, for when the animals were treated with a dextran

hydrolyzing enzyme both caries and plaque formation were greatly inhibited.

The problem of identifying the mechanism by which the microbial plaque is deposited on and adheres to the teeth is a crucial one for dental research. It has important implications not only for the understanding and control of caries but also in regard to the plaques associated with calculus and periodontal disease.

(Fitzgerald, Robert J., National Institute of Dental Research, Bethesda, Md. Plaque microbiology and caries. *Alabama J Med Sci* 5:239-246, July 1968.)

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ANTERIOR DISPLACEMENT OF THE MANDIBLE IN ADULT RHESUS MONKEYS

*J. J. Hiniker and S. P. Ramfjord, J Prost Dent
16(3):503-512, May-June 1966.*

The ability of the temporomandibular joint to adapt to morphological and/or functional changes of the occlusion is a controversial issue. This study was conducted to determine the interrelationship between traumatic or adaptive changes in the temporomandibular joint and the periodontium of rhesus monkeys.

Gold splints were constructed and placed in the mandibular arches of 5 adult monkeys. The splint was constructed in a manner that would cause an anterior displacement of 1.5 mm of the mandible. The monkeys were fed their regular diet and from the day the splints were placed the monkeys did not seem to be handicapped in their eating habits. No weight loss was observed during the testing period. The monkeys were sacrificed at 2, 6, 12, and 40 week periods and histologic sections were made of the temporomandibular joint areas and of the jaws.

As a control, similar histological sections were obtained from 7 other adult rhesus monkeys and other young and old monkeys.

The dentitions of these control monkeys had not been altered or changed in any manner.

The histological results obtained from the experimental animals showed traumatic and adaptive changes in the periodontal tissues and the temporomandibular joints. However, the severest changes occurred in the periodontal tissues.

In the zone of new bone formation around the teeth it appeared that the teeth were moved enough to compensate for the original anterior displacement of 1.5 mm of the mandible. Adaptive changes were still occurring in the 40 week experimental animal—the maxillary teeth which had been forced distally

were reassuming their normal relationship with the mandibular posterior teeth. Also, the temporomandibular joints were returning to their normal position.

The results of this investigation demonstrated that there was evidence of severe trauma due to alteration of the occlusion. The greatest changes occurred in the periodontal tissues while minor changes occurred in the temporomandibular joints. This investigation also confirms the importance of adapting the occlusion to the temporomandibular joint instead of adapting the temporomandibular joints to the occlusion.

(Abstracted by CAPT Perry C. Alexander, DC USN.)

MOP DECONTAMINATION AND MICROBIAL LEVELS OF DENTAL OPERATORY FLOORS

G. B. Pelleu, Jr. and L. W. Wachtel, *Dent Abs* 13(12):742-743, Dec 1968.

The conventional nondetachable mop is a practical tool for wet cleaning of floors in military dental operating rooms, but if no provision is made for decontamination, the mop can become a means of inoculating floors with a large number of microorganisms. Of three chemical decontaminating solutions tested (chlorine, povidone-iodine, and phenol), only the chlorine type reduced the count of microorganisms per mop strand to the allowable level of about 10^5 cfu/strand (colony-forming microbial units per strand). This was accomplished by soaking the mops for 60 minutes or more. Sodium hypochlorite solutions (5 percent) can be prepared easily or may be purchased inexpensively under various trade names, such as Clorox. When the microbial count of a mop had been reduced below the allowable level, any of the disinfectants tested was capable of maintaining that level.

In some environments, such as an operating room, it is necessary to maintain floor counts of microorganisms near zero. Chemical solutions cannot be relied on to reduce mop counts to this level, and autoclaving is not always possible. But 11 percent ethylene oxide, after 18 hours, reduces the microbial levels of heavily contaminated dried mops to a point where no microorganisms can be recovered.

The use of sodium hypochlorite is a practical solution to the problem of decontaminating mops because: (1) it is effective in reducing microbial contamination to an allowable level in a relatively short time, (2) it is inexpensive, (3) it is readily obtainable, and (4) it does not require elaborate equipment.

Floors of dental operating rooms cleaned with mops contaminated with about 10^8 cfu/strand increased in microbial counts up to more than 28 times their normal level of 23 cfu/inch², as determined by aerobic culturing methods. A contamination level of about 10^5 cfu/strand in mops used to wash floors was found to have no measurable effect on floor counts. Each mop consisted of about 1,500 strands.

(Pelleu, G. B., Jr., and Wachtel, L. W., Naval Dental School, Bethesda, Md. Mop decontamination and microbial levels of dental operatory floors. *Milit Med* 133:570-574, July 1968.)

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A CLINICAL COMPARISON OF SEDATIVE AGENTS IN SURGICAL PREOPERATIVE MEDICATION

CAPT H. B. Marble, DC USN.

Despite a number of studies on the efficacy of different drugs, it is still not clear whether hypnotics or tranquilizers can be substituted for barbiturates in the successful sedation of tense or apprehensive dental patients. This report compares, on 92 patients, the relative effectiveness of 750 mg of ethinamate (a hypnotic), 100 mg of hydroxyzine (an ataractic), 100 mg of pentobarbital (a barbiturate), and a placebo. The study was limited to patients whose apprehensiveness was substantiated by their own admission and by objective evaluation. Decreased apprehension was evaluated by the same criteria. After 30 to 60 minutes, pentobarbital had reduced apprehension in 33 percent of the patients, which was of marginal statistical significance as compared with a reduction in only 9 percent of those receiving placebos. Neither ethinamate nor hydroxyzine produced a reduction significantly different from that of the placebo. It was concluded that short-acting barbiturates remain the preoperative sedatives of choice.

(Abstract by Research Work Unit: MR005.19-6053 by CAPT H. B. Marble, DC USN.)

VINYL SPLINTS WITH A TISSUE CONDITIONER IN HEMORRHAGE CONTROL: A CASE REPORT

L. D. Fiedler, J. Frisch, M. P. Levin, and C. C. Alling, *J S Calif State Dent Assn* 36(2):54-57, Feb 1968.

A new method of using a surgical splint to control hemorrhage is described. The patient was being treated for post-extraction hemorrhage of 14 days'

The opinions and assertions contained herein are those of the author and are not to be construed as reflecting the views of the Navy Department or the naval service at large.

duration after extraction of three maxillary teeth (the left central and lateral incisors and first bicuspid) in a routine manner and placement of three black silk sutures to reapproximate the interproximal soft tissue. Although a non-significant history gave no indication of bleeding tendency, persistent hemorrhage had been treated unsuccessfully for 13 days. The decision was made to control the hemorrhage by use of a semiflexible vinyl splint. Lidocaine 2 percent with epinephrine 1:50,000 was infiltrated into the bleeding site to reduce the rate of hemorrhage temporarily. A stone cast of the arch was made from an alginate impression. A sheet of 1/8-inch vinyl was adapted to the cast by use of heat and a vacuum machine. The vinyl was then trimmed to form a splint with a slightly overextended surgical

border. A methacrylate copolymer and a plasticizer were mixed to a viscous consistency as a tissue conditioner. The splint was overfilled with this mixture, seated firmly in the patient's mouth, and sprayed with cold H₂O. The appliance, filled with the conditioner, immediately controlled the hemorrhage. Following a diagnosis of hemophilia, type A (deficiency of coagulation factor VIII), the patient was placed on a dental liquid diet and one unit of frozen plasma was administered 4 times a day until factor VIII was restored. This quick, practical method was devised to control hemorrhage during the time required by the hematologist to determine the causative factor and institute definitive treatment.

(Abstracted by CAPT Nelson W. Rupp, DC USN.)

PERSONNEL AND PROFESSIONAL NOTES

TWENTY-FIRST ANNIVERSARY DENTAL TECHNICIAN RATING

The Dental Technicians Rating, Group XI Dental, was established as a separate occupational group in the rating structure by the Secretary of the Navy on 12 December 1947. It became effective on 2 April 1948.

Dental technicians in over 330 ships and stations throughout the world will celebrate their 21st Anniversary on 2 April 1969.

Historically, prior to the establishment of the Dental Technicians Rating, Pharmacists' Mates were assigned as dental assistants. Currently, there are over 4,100 dental technicians on duty ashore and afloat. Their vital importance is attested to by the tremendous strides made in training from on-the-job, chairside assisting of twenty years ago, to the highly advanced and specialized training programs available today. To stay abreast of rapidly evolving advances in specialized dentistry, there are many educational opportunities afforded qualified dental technicians. Training programs include general dentistry, prosthetics, maxillofacial prosthetics, research assistant, dental repair, and in the field of medical administration.

They can take justifiable pride in their accomplishments in not only providing assistance to dental officers in their professional duties, but also in meeting the increased demands generated by the Navy's Preventive Dentistry Program, which includes the Children's Preventive Dentistry Program as well as active duty personnel. In a large measure, the skill and versatility of trained and knowledgeable

dental technicians are responsible for achieving the desired objectives.

Dental technicians are presently serving aboard ships of the Seventh Fleet, with Marines, Seabee Units, and with Military Provisional Health Assistance Program (MILPHAP) teams in Vietnam. Many others are voluntarily engaged in other civic-action programs which assist the Vietnamese people. These efforts have contributed immeasurably in the pacification program. In grateful recognition of services rendered, many personal decorations, including 20 Purple Heart Medals, were awarded to dental technicians.

DOCTOR HAROLD HILLENBRAND HONORED

Doctor Harold Hillenbrand, Executive Director of the American Dental Association, was recently honored as Reviewing Official of the Recruit Review held at the Recruit Training Command, Naval Training Center, Great Lakes, Illinois.

A 1930 graduate of Loyola University Dental School in Chicago, Doctor Hillenbrand engaged in private dental practice until 1945 when he became editor of the ADA Journal. The following year he became executive director. He previously had been editor of the Illinois Dental Journal and the Chicago Dental Society's Fortnightly Review.

He was the first dentist to serve as an advisor to the official U.S. delegation for the World Health Organization, and is an honorary vice-president of the Federation Dentaire Internationale, worldwide organization of national dental societies.

Doctor Hillenbrand holds the award of Chevalier de l'Ordre de la Sante Publique, conferred by the Republic of France, the Order of Duarte, Sanches y Mella, bestowed by the Dominican Republic, and honorary degrees from the University of Pennsylvania, Loyola University and the National University of Ireland. He is also a fellow in dental surgery of the Royal College of Surgeons in England.

COLLATERAL DUTY ASSIGNMENTS

Frequently it is noted that dental facilities are utilizing Dental Corps officers for collateral duties which properly could be performed by available Medical Service Corps officers, Dental Service Warrant, or in some cases by Master and Senior Chief

Petty officers. The performance of normal collateral duties by these administrative type personnel usually would not adversely affect their performance of regularly assigned duties; whereas, the assignment of such duties to a Dental Corps officer actively providing dental treatment results in eliminating dental procedures during the performance of the collateral duty assignment.

Delineation of administrative authority for Master/Senior Chief Petty officers is provided for in BUPERS NOTICE 5200 of 20 August 1968. Delegation of increased responsibility commensurate with their respective rates will facilitate work requirements and broaden the scope of Master/Senior Petty officers.

NURSE CORPS SECTION

CHRISTMAS IN DANANG

The following letter to the Director, Navy Nurse Corps describes the activities of one group of Navy nurses during the recent holidays. Twenty Navy nurses were first assigned to the Station Hospital, DaNang in August 1967 after attending an "Orientation to Vietnam" course at the Naval Medical School, National Naval Medical Center, Bethesda, Maryland. The tour of duty is one year and there are now thirty-four nurses assigned of which five are anesthetists.

2 January 1969

Dear Captain Bulshefski:

Thank you for your Christmas greetings. I hope your holidays were enjoyed with as much fervor as ours. They were wonderful and also hectic. With so much going on, no one had time to be homesick. Christmas 1968 will hold many warm memories for all of us. On Sunday afternoon 22 December, a group of youngsters from the orphanage put on a Vietnamese version of "Snow White and the Seven Dwarfs" and sang traditional carols, both theirs and ours. This was followed by judging of ward decorations with Lieutenant General Cushman, Major General Anderson, Captain Fitzgerald, Captain Santiago and Colonel Sims doing the judging. The wards really looked lovely and showed much ingenuity considering the materials that were available. The judges had no sooner left than Admiral Kelly, Chief of the Chaplain Corps, arrived and visited all patients.

On Monday, the 23rd, Lieutenant General Lam, ARVN, Commanding General, I Corps, and Mrs. Lam distributed prized gifts (Vietnamese lacquer ware, beaded slippers and silk robes) to both Amer-

ican and Vietnamese patients, including POW's. Before General Lam had finished, the Mayor of DaNang, Colonel Nguyen Ngoc Khoi, came with Vietnamese entertainers who put on a show for ambulatory patients in "The Sand Box" the Enlisted Men's Club. He also brought about 200 dolls dressed in traditional Vietnamese costume for the patients.

On the 24th, we hustled to get the patients onto buses which left at 0900 for the Bob Hope show at Freedom Hill. We had a time keeping bed patients from converting themselves to ambulatory so they could go. It was like getting 100 children ready to go to church on Sunday morning. Commander Alicia Foley stood at the door of the bus and combed hair as they climbed in. We spotted more than a few of our off-duty corpsmen who had converted themselves into blue pajama clad patients but couldn't bring ourselves to take them out of the line.

At 1800, two Santas arrived to give patients their gifts. The Red Cross girls, Commander Foley and I followed behind with punch, cake and cookies. From 1800 to 2330, all staff officers gathered at the club for our own Christmas party. With entertainment, gifts, and goodies it was a very enjoyable one.

Midnight High Mass was impressive and nostalgic, for me at least, as it was sung in Latin by the novices from the Convent across the road. The organ refused to function but their clear, sweet voices sounded better without it. Following Mass, we had our "family" Christmas tree and breakfast in our ward room so we could open our gifts together. There were so many presents we could hardly see each other over the mounds of torn off wrappings. After all the prior activity, I had thought this early morn-

ing party would be a brief one but it wasn't until 0330 that we began to drift off to bed.

At 1800, we had Open House for our staff and friends. We had invited about 200, and I think all showed up plus many more. It was a balmy, clear evening so it really was "open house," including dancing and singing on the patio. We were pleased by the response to our social effort and are already being asked when there will be a repeat. I for one am willing to wait until our anniversary.

December wasn't all party. There were a few less admissions and casualties than in November, but Intensive Care, Acute Surgical and Neurosurgical remained very active throughout the month. There is so much more we could and want to do for our patients but there just aren't sufficient hours in the day for everything. We'd like to provide nursing care at a maximum level rather than an optimum one. At times it is difficult to maintain this even for our very sick patients. I find it is usually the comfort measures and personal services which can mean so much to the injured that go by the board when time is pressing. Duty hours are taken up by a constant round of dressing changes, intravenous fluids, medications, and treatments, most of which add to discomfort rather than relieving it. Bathing, backrubs, position changes, feeding and the like have to be sandwiched in at odd moments. With our young and changing staff, constant supervision is necessary to assure aseptic technique is carried out. We cannot afford even the slightest infection in these extensive wounds.

There was a meeting of military and civilian chief nurses in Saigon, 17 December and we were invited. Commander Foley went since it should be her turn as I had gone to Japan in November. She found the whole trip as well as the meeting and tours of the Vietnamese facilities very interesting. But, like most all who go to Saigon from here, she feels DaNang is a far more preferable location. Major Roy Pratt, AFNC, and Lieutenant (jg) Kline showed her their working situation at MACV and introduced her to their Vietnamese counterparts. Theirs is an important task and I can understand the difficulty in seeing such slow progress. It would take the patience of Job and the maturity of Methuselah to contend with the problems involved.

The unfriendlies were more active in December than in November. Except for loss of sleep they didn't disturb the hospital compound. There was considerable action around us, particularly to the south on the other side of Marble Mountain (which I think I've told you before is only a big hunk of rock

about a mile away). The anticipation of what Tet may bring in mid-February is beginning to build up. My intuition (and that is as good an indicator as anything else) tells me there will be no repeat of last year's Tet, although they may think up something else at a different time.

As usual, my letter writing didn't get completed in one session. I have never found a spot here, including my room, that is free from innumerable interruptions. Even if I did, I probably wouldn't stay in it. My Christmas cards are yet to be written but that is another one of my resolutions, to do them before next July. A Scotch Yankee couldn't possibly miss the opportunity to send them out, postage free.

The New Year was celebrated, although somewhat less arduously than Christmas. There were plenty of fireworks to mark the occasion. The unfriendlies took part but missed the actual date as it wasn't until a bit after midnight so it was really today, 2 January, when they sent their rockets. Our prime hope for the New Year, as I am sure it is everywhere, is that casualties will cease and that Peace will come to this troubled land. May 1969 hold health, happiness and harmony for you.

Sincerely,

/s/ Helen Louise Brooks
CDR, NC, USNR

NURSING ADVISORY GROUP MEET IN SAIGON

Commander Alicia Foley, NC USN, and Lieutenant Commander Gloria Orofino, NC USN, attended a joint meeting of the MACV Nurse Advisory Group in Saigon in December 1968. Nurses, both military and civilian from Vietnam and allied nations participated. The program included a tour of Vietnamese military medical facilities.

The following is a report of the meeting, tour, and observation of the problems confronting nursing in Vietnam today.

At the present time, there are three military nurse advisors; they are LT COL Leslie E. Sharver, ANC, who arrived in the country 5 December 1968, to serve as the Education Advisor to the Vietnamese Military Medical School located in the Saigon area; MAJ Leroy Pratt, NC USAF, assigned to Cui Quan Y, headquarters for the NVNAF Surgeon General; and LTJG Roger V. Kline, NC USNR, Nurse Advisor to Cong Hoa General Hospital. Cong Hoa is the largest RVN medical facility. Mr. Kline was the first of the advisors to be assigned in Vietnam and has paved the way for others who will follow.

The mission of the group is to advise and assist the Republic of Vietnam Armed Forces relating to:

- Determining standards for nursing personnel and nursing care.

- Organizing and establishing a nurse corps.

- Establishing training programs for nursing personnel.

The advisory groups coordinate all efforts with the USAID Nursing Branch, GVN-MOH Bureau of Nursing, the KVNAF Military Medical Service, and nursing personnel of U.S. Army, Navy and Air Force as well as the Free World Forces.

Participants of the meeting were Colonel Althea Williams, ANC, USA; Lieutenant Colonel Tao, Chief Nurse for Vietnam, Nurse Corps, Republic of Korea Army; Captain Nguyen Loi, KVNAF, nurse; Miss Lum Thi Hai, Chief Ministry of Health, nursing, Vietnam; Miss June Pirnie, Chief of USAID nursing branch; and Miss Helen Ann Lynski, USAID, nursing branch education.

Major Pratt briefed the group on the position of nursing today in Vietnam, both civilian and military. At present there is no Nurse Corps as such in the Vietnamese military set-up. Personnel are assigned to nursing duties by the Chief, Personnel Division, of the Personnel, Training and Finance Service. This position is held by an MSC officer who may or may not have a nursing background or an awareness of the needs of nursing units within the hospital. There are tentative plans to create a nursing section under the Chief of Professional Services.

The problems and frustrations are many for the advisors.

- The philosophy of life and death of the people is different from our own.

- The social and economic pressures during war time greatly color the educational process.

- Lack of adequate training programs which emphasize direct patient care and which would prepare personnel to assume professional responsibilities for improved standards of patient care.

- Lack of qualified nursing leaders and instructors to guide and direct nursing personnel in the performance of their duties.

- Apparent lack of motivation on the part of nursing personnel to improve their status and performance.

- The variety of existing programs for preparation of nursing personnel, with the majority of them devoting little time to actual patient care or clinical experience.

In addition to the problems relevant to the Viet-

namese situation, advisors contend with several problems of their own. Transportation for visits to their assigned areas and to establish contacts which could assist in their work is difficult to come by. At present there is only a one ton truck for the use of the three advisors. Communicating is difficult and tedious even when the language barrier is not considered as the telephone service is overtaxed and at best leaves much to be desired.

Mr. Kline conducted the group on a tour of Cong Hoa General Hospital. The bed capacity is 1800. The census normally runs between 2,200-2,400 patients. During Tet and the May offensive it was as high as 4,000. All specialties are represented here and a Rehabilitation Center is located adjacent to the hospital. There is also a POW ward. There are many basic needs that must be met in order for quality care to be provided. Sanitary conditions are poor. Dirty dressings, trash, garbage and other waste are dispersed around the hospital compound. Mr. Kline has been instrumental in motivating personnel to burn some of this but the facilities for incineration are limited. At times, the enthusiasm for the burning procedure has resulted in hazardous conditions. Flies and mosquitoes reign supreme. The few screened areas often had doors missing and there were large holes in the screening. Hand washing facilities were grossly inadequate. Storage space is at a premium so that clean and contaminated supplies and equipment are handled and stored together.

Food preparation is done at considerable distance from where patients are housed and ward personnel must go to obtain it, leaving patients unattended. Rice is the primary staple with only occasional small servings of meat or broth. This food allowance does not provide the necessary requirement for acutely ill or convalescent patients.

Nursing service lacks authority and a formal structure. The ward physician who is present for only brief periods of time has complete authority and little is done without his permission or approval, including basic personal care and attention to the comfort of the patients. Observation of patients has low priority and after 1730 only one nurse, designated as a guard, attends a large number of patients. This nurse has worked through the day and sleeps on the ward at night. The deficiencies in nursing education and administration may well be the cause for the poor utilization of personnel and the limited facilities that do exist. Long duty hours, the low social status of nurses, poor living and working conditions and grossly inadequate salaries are major contributing factors to the problems which beset

nursing in Vietnam. Fortunately, there are a few dedicated people who are motivated to improve the standards of nursing practice and are most receptive to assistance that is offered.

Mr. Kline has contributed much during his tour as an advisor. Small changes have been made and seeds for future progress have been planted. It is hoped that the Vietnamese staff will initiate changes and improvements as they become more conscious of the need to develop higher standards. It would appear that the need for advisors will continue for some time to come. Among the most pressing need of Vietnamese nursing, is the organization of nursing service so that it is patient centered, particularly in the area of clinical practice and environmental sanitation. This, at the present time is the major objective of the advisory group.

The role of the advisor requires tremendous patience, a sound background of nursing knowledge and varied clinical experience in all phases of nursing, including nursing administration and education. It requires maturity of judgment, emotional stability and a high frustration level to accept existing conditions with tolerance and understanding. There must also be full awareness that change will come slowly and only when it is desired by Vietnamese nursing personnel themselves.

Despite problems, the advisory group appears optimistic and are encouraged by slight changes and signs of progress.

/s/ Alicia M. Foley
CDR, NC, USN

RESEARCH SECTION

LIST OF RECENT PUBLICATIONS FROM RESEARCH LABORATORIES

The following papers have been completed by research activities under the direction of the Bureau of Medicine and Surgery.

Naval Aerospace Medical Institute:

- "Brain Stem Control of Respiratory Depth and Rate in the Cat," by Pei Chin Tang. *Respiration Physiology* 3(3), December 1967.
- "Development of an Aviation Combat Criterion: Preliminary Report," by George M. Rickus, Jr., and James R. Berkshire. NAMI-1047, August 1968.
- "Effect of Drugs and Ocular Counterrolling," by Earl F. Miller, II, and Ashton Graybiel. NASA Joint Report with NAMI: NAMI-1046, August 1968.
- "Evaluation of Sixteen Antimotion Sickness Drugs Under Controlled Laboratory Conditions," by Charles D. Wood and Ashton Graybiel. Joint Report with NASA: NAMI-983, August 1968.
- "Influence of Alcohol and Dramamine, Alone and in Combination on Psychomotor Performance," by Pei Chin Tang and Robert Rosenstein. *Aerospace Medicine* 38(8), August 1967.
- "A Sixty-Minute Vigilance Task with 100 Scoreable Responses," by Robert S. Kennedy. NAMI-1045, July 16, 1968.

Naval Medical Field Research Laboratory:

- "Body Armor in a Hot Humid Environment," by W. E. Yarger, L. H. Cronau, Jr., and R. F. Goldman. NMFR Report XVIII(16), September 1968.
- "The Effect of Selected Soft Drink Mixes on the Germicidal Properties of Iodine Tablets," by N. S. Hurst and James S. Bird. NMFR Report XVIII(14), August 1968.

Naval Medical Research Institute:

- "Analysis of the Polydispersity of Acetylcholinesterase by Transport Methods in the Ultracentrifuge," by Melba A. Craffus, S. L. Friess, and David B. Millar. *Archives of Biochemistry and Biophysics* 126(2), August 1968.
- "Interpersonal Exchange as a Function of Reward/Cost and Situational Factors: Expectancy Confirmation-Disconfirmation," by D. A. Taylor, I. Altman, and R. Sorrentino. *Proceedings of the 76th Annual Convention, APA*, 1968.
- "Observations on Contracting Monkey Hearts Maintained in Vitro at Hypothermic Temperatures," by Theodore I. Malinin and Vernon P. Perry. *Johns Hopkins Medical Journal* 122(6), June 1968.
- "Fetal Bigeminy and Tachycardia," by R. Bernstein, J. Winker, and C. Callagan. *American*

Journal of Obstetrics and Gynecology 101(6), July 15, 1968.

"Piroplasms (*Protozoa: Sarcodina*) of Wild Mammals in California," by P. F. D. Van Peenen and J. F. Duncan. *Bull Wildlife Disease Assoc*, Vol 4, January 1968.

"Review of Biochemistry of the Calcified Tissues," by Robert Van Reen. *Journal of the American Dental Assoc* 76(6), June 1968.

"Review of the Literature on Cryopreservation of Bone," by Philip J. Boyne, Proceedings of the Second Cryopreservation Conference. *Criobiology* 4(6), 1968.

"Thermal Model for Retinal Damage Induced by Pulsed Lasers," by Jude R. Hayes and Myron L. Wolbarsht. *Aerospace Medicine* 39(5), May 1968.

Naval Medical Research Unit No. 2:

"An Albino Ferret-Badger, *Melogale Moschata Subaurantiaca* (Swinhoe), From Taiwan," by Gwilym S. Jones and Tseng, Chang-Sheng. *Formosan Science* 22(2), 1968.

"Compulsive Water Drinking Simulating Diabetes Insipidus," by Jen-Tse Cheng, Robert A. Gutman, and Wan-Yu Chen. *Journal of the Formosan Medical Association* 67(5), May 28, 1968.

"Low Incidence of Erythrocyte G-6-PD Deficiency in Koreans," by R. Q. Blackwell, I. H. Ro, and L. Yen. *Vox Sanguinis*, Vol 14, 1968.

"Nematode Parasites of Oceanica. III. *Arthrostoma Vampira* Sp. N., with a Reconsideration of Those Hookworms Having Articulated Buccal Capsules," by Gerald D. Schmidt and Robert E. Kuntz. *Journal of Parasitology* 54(2), April 1968.

"The Pathophysiology of Cholera," by J. W. Fresh, E. J. Kim, and Vincente Reyes. *Bulletin of Pathology*, May 1968.

"Primate cysticercosis: *Taenia hydatigena* in Kenya vervets (*Cercopithecus aethiops* Linnaeus, 1758) and Taiwan macaques (*Macaca cyclopis*

Swinhoe, 1864)," by R. E. Kuntz and B. J. Myers. *Primates*, Vol 8, 1967.

Naval Submarine Medical Center:

"Dietary Habits and Related Factors in FBM Crew Members," by James K. Summitt and William R. Shiller. Report No. 539, July 12, 1968.

"Fungal Flora of the Submarine Environment During Prolonged Submergence," by William C. Milroy. SMC Report No. 535, June 17, 1968.

"Head Positioning for the Panorex X-ray Machine," by William R. Shiller. Report No. 543, August 20, 1968.

"In Vivo Assessment of the Solubility of Tooth Enamel during an FBM Patrol," by Dale T. Zorn and William R. Shiller. Report No. 537, June 24, 1968.

"Operational Abstracts of Research Reports Completed during the Period 1 January 1968 to 1 July 1968," prepared by Charles F. Gell. Memorandum Report No. 68-12, July 1, 1968.

"Responses to the Underwater Distortions of Visual Stimuli," by Jo Ann Kinney, Saul Luria, and Donald Weitzman. Report No. 541, July 16, 1968.

"Test Thresholds to Bitter Compounds during a Submarine Patrol," by John W. Nesson and William R. Shiller. Report No. 538, June 25, 1968.

"Thermal Evaluation of a Polyvinylchloride Exposure Suit (Empress) and Comparison with Present Submarine Deck Exposure Suit," by David A. Hall and Joel J. Nobel. Report No. 527, May 22, 1968.

"Use of Circumaural Earphones in Audiometry," by J. Donald Harris. Report No. 540, July 15, 1968.

Naval Medical Research Unit No. 4:

"Effect of Influenza Vaccine on the Isoagglutinin Titer in Navy Recruits," by E. A. Edwards, M. J. Rosenbaum, W. E. Pierce, and R. O. Peckinpugh. *Health Laboratory Science* 5(3), July 1968.

AEROSPACE MEDICINE SECTION

WHAT'S WITH OUR FLIGHT SURGEONS—STATUS REPORT

On 31 December 1968 there were 465 authorized Flight Surgeon billets and 438 designated Naval Flight Surgeons on active duty in a duty involving flying status, plus 2 Aerospace Medical Examiners.

| Rank | Authorized Billets | On Board* |
|-------|--------------------|-----------|
| RADM | 2 | 2 |
| CAPT | 60 | 73 |
| CDR | 56 | 40 |
| LCDR | 68 | 242 |
| LT | 279 | 83** |
| Total | 465 | 440 |

*On Board ranks include selectees for promotion

**Includes 2 Aerospace Medical Examiners

To replace those Flight Surgeons who retired, resigned, were released upon completion of obligated service or who entered clinical residency training, 55 Navy Flight Surgeons were graduated from the Naval Aerospace Medical Institute at the Naval Aerospace Medical Center, Pensacola, Florida, during the past 6 months. The Institute also trained 3 officers of the Army Medical Corps during this period.

Flight Surgeons are involved in selective retention on active duty under the provisions of NAVOP 04-68 (ALNAV 45-65). Many have been extended for 12 months and a few have been released on a selective basis after a 6-month extension. The increased input into the Naval Aerospace Medical Institute has alleviated the Flight Surgeon shortage to a small degree but the full benefit will not be seen until late 1969.

The total number of Flight Surgeon/Naval Aviators on 31 December 1968 was 16. One Flight Surgeon began Naval Aviator training in January 1969 and another will begin in the summer of 1969. One Flight Surgeon/Naval Aviator remains in the Astronaut Program. Future plans include refresher helicopter training for one Flight Surgeon and Naval Flight Officer (NFO) training for another.

There are 19 Flight Surgeons in the various phases of the Aerospace Medicine Residency and 6 have been approved to begin the residency in 1969. Seven Naval Flight Surgeons were certified in Aerospace Medicine by the American Board of Preventive Medicine in 1968.

Because of an existing requirement for flight physicals on naval aviation personnel stationed in the Canal Zone, the District Medical Officer, 15th Naval District, an internist and former Flight Surgeon, has been ordered to duty involving flying as a Flight Surgeon.

The Force Medical Officer billet, Fleet Marine Force, Pacific, will be filled by a Flight Surgeon in early 1969.

Three Navy Flight Surgeons served on the Joint Committee on Aviation Pathology and attended meetings at the Naval Safety Center and at the Armed Forces Institute of Pathology.—AeroMed, BuMed.

"THOUSAND AVIATOR" STUDY CONTINUES

In 1940, CAPT Ashton Graybiel, MC USN (Ret), then a Commander, initiated the "1000 Aviator" study at the Naval Air Station, Pensacola, Florida under the sponsorship of the old School of Aviation Medicine, in cooperation with the National Research Council. This study, which included a detailed history, physical and mental examination, including an EKG, on 964 flight students and 92 flight instructors, was concluded in 1941. The original purpose of the study was to relate the aviator's test scores to his success in completing flight training in order to determine means of selecting the most promising candidates for flight training. However, the study has additionally, over the years, provided significant data for the investigation of cardiovascular disease and aging. Follow-up studies on survivors of the original "1000" have been conducted in 1951-52, 1957-59 and 1962-63.

The fifth follow-up study is to begin shortly, and at the present time Doctor Graybiel, now Director of Research, Naval Aerospace Medical Institute, Doctor Albert Oberman, Associate Professor, University of Alabama Medical Center, Birmingham, and Doctor William R. Harlon, Director of Clinical Research, Medical College of Virginia, Richmond, are preparing plans for the new study. Doctors Oberman and Harlon, together with CAPT Robert E. Mitchell, MC USN, will be the project investigators on this fifth study. Doctor Mitchell has participated on a previous "1000 Study". He is presently the Commanding Officer, Naval Hospital, Rota,

Spain but will be returning to Pensacola in late summer, 1969.

There are 789 survivors of the original group. These survivors, a number of whom are still on active flying duty, will be brought to Pensacola for physiological and psychological testing. This present study is being jointly sponsored by the Bureau of Medicine and Surgery, the Army and the FAA.—AeroMed, BuMed.

NAMI GRADUATION

On 18 December 1968, at graduation exercises held at the Naval Air Station, Pensacola, 55 Naval Flight Surgeons, 3 Army Flight Surgeons, 6 Naval Aerospace Psychologists and 1 Naval Aerospace Physiologist received their new designations and wings. The class was addressed by CAPT John M. Miller, USN, Chief of Staff, Naval Air Basic Training Command. Certificates of Designation were presented by RADM Herbert H. Eighthy, MC USN, who also presented the Surgeon General's Award to LT Paul J. Gregory, MC USNR. Following graduation and a brief leave, LT Gregory reported to CVW-9 which deployed aboard the USS ENTERPRISE (CVA(N)-65), departing Alameda for WESTPAC on 6 January 1969.

(Editor's Note: Doctor Gregory was aboard Enterprise during the tragic explosions and fire that occurred on 13 January 1969. Although we have had no specific reports from the Enterprise's Medical Department as this goes to print, we know that the Department upheld the fine traditions of our Naval Medical Corps. Such unfortunate and terrible incidents have each taught us lessons which are of value in preparing to cope with future emergencies and no doubt the same will be true of this one. When we do receive the Enterprise's report, we shall pass on its lessons to you.)—AeroMed, BuMed.

NAVAL AEROSPACE PHYSIOLOGIST MEETING

The Seventh Annual Meeting of Naval Aerospace Physiologists was held 13 through 15 November 1968 at the Naval Training Device Center, Orlando, Florida. The purpose of these meetings is to elaborate on concepts relating to physiological stresses, crew systems development, administration and management as it pertains to the Aerospace Physiologists and future physiological training program development.

CDR Paul W. Scrimshaw, Jr., MSC USN, Aerospace Physiologist on the Staff, Commander Naval

Air Forces, Atlantic Fleet, acted as chairman for the meeting. CAPT J. W. Miller, Commanding Officer, Naval Training Device Center, extended a welcome aboard, and CAPT Mary F. Keener, Chief Aerospace Physiologist, Bureau of Medicine and Surgery, extended greetings to all attendees. Guest speaker at the banquet held on 13 November 1968 was CAPT M. D. Courtney, MC USN, Director, Aerospace Medicine Technical Division, Office of the Assistant Chief for Aerospace Medicine, Bureau of Medicine and Surgery, Washington, D.C. Attendees gave him a standing ovation at the completion of his talk, "The Aerospace Physiologist as a Member of the Aerospace Medical Team."

Attendees were given a special tour of the John F. Kennedy Space Center, National Aeronautics and Space Administration and Cape Kennedy on 15 November 1968.—AeroMed, BuMed.

AEROSPACE PHYSIOLOGISTS ATTEND USAF SYMPOSIUM

LCDR Donald E. Furry, MSC USN, Bureau of Medicine and Surgery, Washington, D.C. and LT Durward L. Rhodes, MSC USN, Naval Training Device Center, Orlando, Florida, represented the Navy at the Physiological Training Officer Symposium held at the U.S. Air Force School of Aerospace Medicine, Brooks Air Force Base, 6-10 January 1969.

This Symposium was designed for Physiological Training Officers, Aviation Physiologists, Flight Surgeons and Medical Officers actively supporting the USAF Physiological Training Program. The purpose was to present the latest theories, findings, and technological developments in the field of aerospace physiology. Particular emphasis was given to the familiarization with new innovations and developments in aerospace physiology, reviewing problems encountered in the basic program in the field to establish more effective training and the proper coordination between physiological training personnel and other facilities involved in physiological training and aerospace medicine.—AeroMed, BuMed.

SELF-PROPELLED EJECTION SEATS

Our ejection seats have saved many aircrewmembers when their aircraft has been crippled by enemy gunfire. However, too many of these airmen have drifted safely to the ground only to be taken captive by the hostile forces who shot them out of the air. This may not be any more, if some of the far-out dreams

of our engineers come to fruition. They would like to put wings or rotors and an engine on the seat so that our aircrewmembers can "fly" their ejection seat into a more friendly environment.

Last summer the Naval Air Systems Command initiated a Request for Proposal (RFP) for concepts on an Integrated Aircrew Escape/Rescue System Capability (AERCAB) as part of the Search and Rescue Long Range Program. Eighteen different proposals were received, which were cut down to five, and finally two. The proposals of Fairchild Hiller and LTV/Kaman were the two selected and given contracts to conduct feasibility studies on their design concepts for AERCAB.

The Fairchild Hiller concept proposes a fixed-wing, jet-powered design which is capable of approximately 30 minutes of flight at 110-120 KIAS and a rate of climb of 1000 FPM. At burnout or earlier, if desired, the survivor is separated from the seat and normal parachute deployment and descent takes place.

In the Fairchild design all components for flight are mounted on the seat back. The seat ejects normally from the stricken aircraft and is stabilized by the drogue chute. Upon seat rocket burnout a tail-boom with rudder and tail surfaces are ballistically deployed from the back of the seat, then extensible sailwings with rigid leading edges are deployed to either side, again ballistically. An inflatable nose-fairing is then actuated encapsulating the occupant in an open cockpit and the thruster engine, either a turbo-jet or a turbo-fan, is rotated to the under side of the vehicle and is started by the automatic firing of a cartridge. The AERCAB is then in powered, controllable flight. This entire sequence occurs in 3 seconds.

The LTV/Kaman concept is called "SAVER" or Stowable Aircrew Vehicle Escape Rotoseat. This design consists of an unpowered, extendable two-bladed rotary wing, combined with a jet thruster engine. It is capable of controllable flight after an ejection at a minimum altitude of 1000 feet, with a climb rate of 1000 FPM. All components are mounted on the seat back with the thruster engine, probably a turbo-fan jet, hinged so that in the stowed position it folds back under the seat. Upon ejection the stowed rotor is deployed, followed by a tail boom with rudder and the jet engine rotates to the rear of the seat, providing horizontal thrust. This sequence is fully automatic and occurs in 6 seconds. Lift is provided by auto-rotation of the rotor in conjunction with the forward thrust of the jet engine. A powered landing can be made or after burnout of the engine,

which operates on emulsified fuel, and auto-rotational descent and landing can be accomplished. Happy Landings!—AeroMed, BuMed.

PILOT'S NEW PARD'NER

Reaching nearly two centuries into the past, Goodyear Aerospace has revived the ancient art of hot air ballooning to develop a system for snatching pilots to safety after they have bailed out over enemy territory.

Hot air ballooning was first used by the French in 1783 to produce the earliest manned flight. Now the principle is being incorporated into a system called PARD—Pilot Airborne Recovery Device—which aims at allowing the ejected pilot to remain aloft until a rescue plane can reach and retrieve him in mid-air.

PARD is being developed for the U.S. Air Force's Life Support Systems Program Office at Wright-Patterson Air Force Base, Ohio.

Key to PARD is a BALLUTE,* a cross between a balloon and parachute. This spheroidal, self-inflating device—developed by Goodyear Aerospace—has demonstrated excellent stabilization and deceleration characteristics in recovery and re-entry systems. It is made of lightweight, nonbulky material.

In the PARD system, the Ballute is attached to the top of the pilot's main parachute and stored with the packaged parachute assembly. Initiation of PARD is left to the discretion of the pilot. It is designed to go into action after the pilot has ejected from the disabled aircraft and his main parachute has opened. Here is the way it works:

The Ballute, at the top of the deployed main parachute, is inflated as air rushes through its vent.

A burner, suspended below the Ballute and fed from a tank of propane gas strapped to the pilot's back, ignites. This heats the air flowing into the Ballute and raises the temperature to 250 degrees Fahrenheit.

The heated air gives the Ballute sufficient "lift" to halt the pilot's descent and permit him to rise and float high above the ground, well beyond the range of enemy small arms fire.

The hot air in the Ballute keeps the pilot aloft for approximately 30 minutes. Meanwhile, the main parachute hangs limp, providing backup safety.

The 30 minutes aloft allows time for a rescue aircraft, guided by a signal from a radio in the pilot's survival kit, to locate and snatch him in mid-air.

* TM, Goodyear Aerospace Corporation, Akron, Ohio.

The pilot then can be reeled into the rescue plane. Or he can be towed into friendly territory, where he is released to descend by means of his regular parachute.

The recovery system has a built-in safety device that allows for automatic operation in case the pilot is incapacitated; it is preset to carry him to 6000 feet. However, PARD also can be operated manually, and the pilot can increase his hovering altitude to as high as 10,000 feet.

PARD is performing well in final systems testing. The recovery system shows promise of circumventing problems that arise when crew members have to bail out before the disabled aircraft can be flown clear of hostile areas.—Goodyear Aerospace Corporation (Profile).

(Editor's Note: The above article appeared in the Fourth 1968 Issue of Goodyear Aerospace publication "Profile." It gives another approach being investigated in the long range SAR program to prevent the crewmen of aircraft shot down in combat from becoming POW's.)

FLIGHT PHYSIOLOGY CHARTS

A new series of classroom charts on Flight Physiology and Personal Equipment, designated Device 2G27A by the Naval Training Device Center, was distributed in December 1968 to activities conducting physiological training programs.

Production of the charts was a joint U.S. Air Force and U.S. Navy project. The Technical Advisor for the project was LCDR Donald E. Furry, MSC USN, of the Bureau of Medicine and Surgery. Scientific data and format for the seventy-two multi-colored charts were prepared by a joint committee consisting of COL James W. Evans, Jr., USAF, MAJ Ellis Aboud, USAF, CAPT Kenneth J. Sherwin, USAF, MAJ Rudolph A. Lucchesi, USAF and LCDR Donald E. Furry, MSC USN.

Sets of thirty-five millimeter color slides of the charts will be prepared as a supplement to this device and will be distributed in June 1969 as Device 2G27B.—AeroMed, BuMed.

FLOATABLE ARMOR VEST DESIGNED

Development of the first floatable armor vest capable of stopping 30-caliber armor-piercing projectiles has been announced. The boron carbide composite vest, encapsulated in polyethylene foam to make it float, was developed jointly by Norton Company's Protective Products Division at Worcester and Navy's Clothing and Textile Research Unit, Natick, Mass.

The new vest not only floats, but provides buoyancy to the user, acting like a bullet-proof life preserver. Typical application would be for river patrol boat personnel facing small arms fire from shore.

The boron carbide armor composite is the lightest weight (about seven pounds per square foot) material known capable of stopping .30 caliber armor-piercing ammunition. Widely used on helicopters and by air crew personnel, it was not floatable, and a man wearing it faced the danger of drowning if he went into deep water. This new vest solves this problem.—Naval Aviation News.

AN EXAMINATION OF CARRIER FLIGHT DECK AND HANGAR DECK LIGHTING SYSTEMS

There is no question concerning the importance of vision to an aviator. The fact that the accident rate during night carrier operations is much higher than that found for day activities attests to the differences in operating in a visually deprived environment. However, while the importance of proper vision is unquestioned, there remain many questions concerning the best procedures for aiding and supplementing the vision of an aviator during night operations. In attempting to resolve these issues, it is necessary to examine the complete environment of the aviator and the visual tasks he is called upon to perform. This paper describes one important item which serves to structure his visual environment. This is the lighting used both on the hangar deck and on the flight deck of an aircraft carrier.

The history of carrier lighting systems shows an almost continuous change since World War II. During the Second World War, flight deck lighting was virtually nonexistent. There was normal lighting at the ramp and down the center line of the deck. The lighting issue was not considered of paramount importance, however, since night operations were extremely limited until CDR William Martin developed the first night fighter squadron aboard the carrier Enterprise in 1944. Even following the successful use of this squadron, night operations represented a rather specialized type of flying for some time with only a few aviators qualified to participate.

In 1947, deck lights were changed to give the appearance of a lighted runway rather than a single line of lights. This remained standard for a long period of time, although in the late 1950s the mirror landing system was added as a means of providing improved positional information to the pilot during the final approach to landing. During all of this time, the hangar deck area and all passageways lead-

ing to the flight deck were lighted with low-level red lights. This was intended both to protect the dark-adaptation of the aviator for his flight activities and to aid both aviators and deck personnel as they moved amidst whirling propellers on a flight deck which was an area of virtual total darkness.

In 1960, a red floodlighting system was installed on the USS Coral Sea (CVA-43). The sole purpose was to aid personnel operating on the flight deck. It was not intended as a means of helping the pilot during the landing phase. The red floodlighting was restricted primarily to central deck areas. No flood lighting was provided on the forward deck since it was felt that any additional light on the front of the ship would interfere with the lookout capability of persons on the bridge, up in the island. Particularly during haze conditions, any light in forward areas would tend to produce a prevailing glare through which it would be almost impossible to see.

The red floodlighting systems met with almost universal acceptance and soon were installed on a number of carriers. Then, in 1964, the Navy Bureau of Ships carried this program one step farther with the installation of white flight deck lighting on the USS Saratoga (CVA-60). In this case, the purpose was both to aid aircraft handling operations on the deck and to provide better landing information to the pilot. Again, the immediate acceptance of the new system led to its installation on additional carriers. At the present time, the white lighting system is being used on almost all operating carriers. These ships, however, all retain the red lighting system so that the Commanding Officer may switch from one to the other at his discretion during various phases of flight operations.

The following sections describe these two lighting systems in more detail. However, it must be noted that specific information which is presented refers only to the operations of one ship at one point in time. There is considerable variation from ship to ship both in the installation features of the lights, both on the flight and hangar deck, and in the manner in which the lights are used. The intensity of both red and white systems is controlled through a variac located in pri-fly and generally is set at a level which both pilots and ship's personnel agree is optimum. Obviously, this will not be perfectly consistent from one ship to another.

Red Floodlighting

On the USS Enterprise (CVAN-65), the principal effect of the red lights is in areas of major aircraft movement. Both the ramp and bow areas receive

little if any benefit from this lighting system. The red light pattern is produced by three banks of 300 watt bulbs located on the island of the carrier. Inasmuch as each light is individually adjusted to illuminate a desired area, the pattern of illumination varies from ship to ship.

Figure 1 shows red light intensities¹ measured at a number of deck locations on the Enterprise. Intensities recorded in center areas of the angled deck correspond approximately to light levels which would be found under full moon conditions. Intensities at the ramp and bow are quite low, corresponding roughly to the light from a first quarter moon. However, these are the light levels which would have been found over the entire deck prior to use of red floodlighting. The red floodlighting thus produces an improvement which is almost an order of magnitude in effective intensity in the center working areas of the deck.

Even with the red floodlights, a carrier flight deck remains a dark and dangerous working environment. In order to insure maximum vision for persons moving from other sections of the ship onto the flight deck, carriers have for years used low intensity red lighting in ready-rooms, in hangar bays, and in all passageways leading to the flight deck. Every effort was taken to insure maximum night vision capability for aviators and for deck personnel. However, this system is not without certain penalties, the principal one being its effect on the aircraft movement and maintenance activities which must be carried on in the hangar bays while flight operations are in progress.

Table 1
Hangar Deck Red Light Intensities

| Normal Work Areas | Enterprise | America |
|-------------------|------------|---------|
| Maximum | .9 ft-c | .6 ft-c |
| Minimum | .03 | .03 |
| Average | .6 | .2 |

Table 1 shows light levels measured under the red hangar deck lights in the carriers Enterprise and America. On the Enterprise, light levels averaged about .6 foot-candles and ranged from .9 down to 0.3 foot-candles. On the America, measured intensities were somewhat lower, averaging about .2 and ranging from .6 down to .03 foot-candles. Although the Enterprise levels appear to be somewhat better than those of the America, in either case the intensities are quite low for maintenance activities and even for the more gross labors such as towing aircraft. Of course, working personnel use red

¹ Measures were obtained with a Spectra Combi 500 Light Meter especially calibrated for use at low intensities.

hooded flash lights to improve the lighting on specific objects but, even so, the general light level is rather low in terms of the activities that must be accomplished.

White Floodlighting

The USS America (CVA-66) is one of a number of carriers to be equipped with a white flight deck floodlighting system. The pattern on the America flight deck is produced by 27 bulbs located in banks slightly above the pri-fly level on the carrier island. The bulbs have been adjusted to provide a relatively constant light level through the entire landing and rollout area of the flight deck. Again, the forward deck area is kept in darkness in order not to interfere with the vision of personnel on the bridge. Thus, although parts of the flight deck are well illuminated, at least by previous standards, there still remain a limited number of normal work areas, such as the forward elevator and the forward aircraft launch and parking area, which are in almost total darkness.

Figure 2 shows the intensities which were measured under the white floodlights of the America. Readings taken at various positions along the angled deck range from 1.25 to 2 foot-candles. This light level is roughly equivalent to that found at sunset, when the sun has just passed below the horizon. This is an order of magnitude improvement over the best intensities recorded under the red floodlighting system. It should be noted also that the recorded levels are relatively consistent through the entire length of the angled deck, with the ramp area having much better illumination than with the red lights.

Benefits of Red and White Systems

Having compared the patterns and illumination intensities produced by the red and white carrier lighting systems, the next issue becomes one of assessing the nature and extent of the benefits found with the use of these new systems. It also is important to examine any secondary problems which might exist. For instance, does the use of white floodlighting on the flight deck have any implications for the use of red cockpit lighting?

In order to obtain information concerning these lighting systems, twenty-five Fleet aviators were interviewed at the Oceana Naval Air Station in September 1967. Table 2 shows the characteristics of this sample of aviators.

Table 2
Experience Background of Pilots Interviewed
Concerning Carrier Lighting Systems

| | |
|---|---------|
| Number | 25 |
| Number of Squadrons | 5 |
| Type of Aircraft | VA & VF |
| Number of Sea Duty Tours | 1-3 |
| Number of Carrier Landings | 55-498 |
| Pilots Having Experience with White Floodlighting | 25 |
| Pilots Having Experience with Red Floodlighting | 20 |
| Pilots Having Experience with No Floodlighting | 14 |

Of the twenty-five pilots interviewed, a number had recently returned from Vietnam duty. Others had just arrived from a Mediterranean tour. As can be seen in Table 2, interviewees were selected from both attack and fighter squadrons. Each pilot had a number of carrier landings to his credit, with some having completed as many as three tours of sea duty. All twenty-five aviators had had experience with the white flight deck lighting system. Of these, twenty also had had experience with the red floodlights. Finally, fourteen had operated from carriers having no floodlighting. The prior experience of these pilots thus was entirely satisfactory for purposes of this survey.

An initial question asked of the interviewees concerned the manner in which the white floodlighting system was used during their last carrier tour. Table 3 presents the results.

It can be seen that most carriers use the white floodlights only during the recovery phase of flight operations. Six of the carriers used the white floodlights during both launch and recovery operations. Other carriers used these lights in a variety of ways, including three which kept the white floodlights on at all times during night operations. It should be noted here that these results do not pertain to twenty-five aircraft carriers. These results are relevant only to the usage of the lights on a particular carrier during the last tour of the pilot being interviewed. As noted earlier, the use of these lights will change with each carrier tour.

Table 3
Use of White Floodlighting
(Based upon pilots' recall from last sea tour)

| Phase of Operation | No. of Responses |
|---------------------------------|------------------|
| Recovery only | 9 |
| Launch and recovery | 6 |
| Prelaunch and recovery | 4 |
| Prelaunch, launch, and recovery | 2 |
| Prelaunch only | 1 |
| All night operations | 3 |

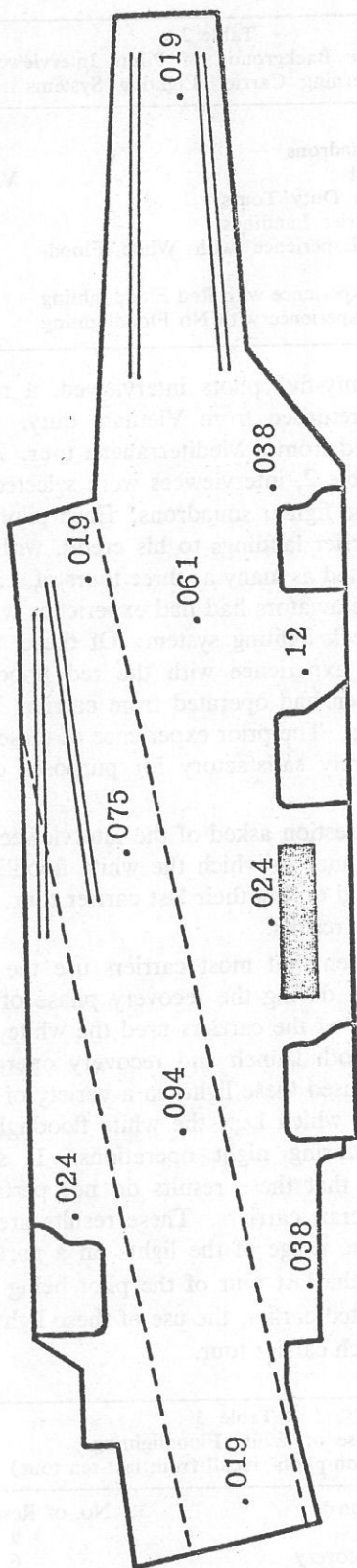


Fig. 1. Flight deck red light intensities, USS Enterprise (CVA(N)-65).
(Unit of measure: footcandles)

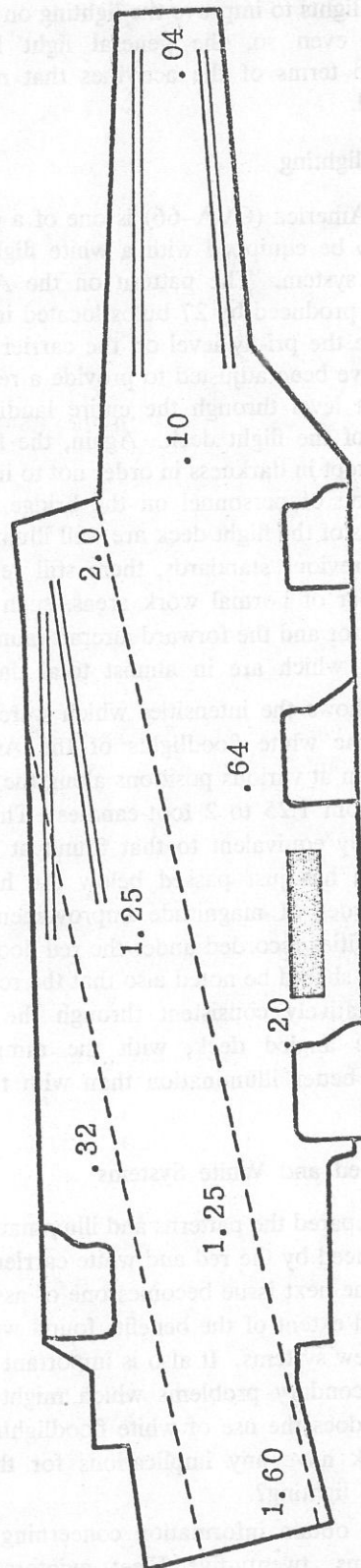


Fig. 2. Flight deck white light intensities, USS America (CVA-66).
(Unit of measure: footcandles)

The next question in the interview dealt with differences in the use of red lighting within the carrier while the white floodlights were being used on the flight deck. The results, as seen in Table 4, show that most carriers continue to use red lighting in passageways and ladders leading to the flight deck. However, only about half of the carriers now routinely use red lighting in the readyrooms and in the hangar bay area while the white floods are in operation. This, of course, is a substantial departure from earlier days in which red lights were consistently used in the hangar bays during flight operations.

The next phase of the interview dealt with possible problems which might exist with the white floodlights. During early consideration of this system, concern had been expressed that a problem might arise during a bolter pattern, that is, where an aircraft lands on the deck, fails to catch a wire, and immediately becomes airborne and reenters the carrier pattern. In this case it was felt that the brief exposure to the white lights while on the deck might interfere with the transition back to the dim red cockpit instruments when reentering the pattern. Each of the twenty-five pilots was questioned concerning this point. Twenty-four reported no bolter problems at all. One mentioned a slight problem relating to reflections of the light from a low overcast when transitioning back to instruments.

All pilots agreed that weather conditions present no problems which are peculiar to the white lighting system. Several noted that the white lights tend to create a slight glow around the carrier during an approach through a low ceiling, but that this in no way interferes with the success of the landing operation. Pilots next were questioned concerning their preferences for red versus white deck lighting systems and the reasons underlying these preferences. From the pilots' point of view, virtually all felt that the white system is considerably better than the red and that the red is a little better than none. Whereas the red provides certain definite advantages over no

lighting for many of the deck activities, it offers no aid to landing. On the other hand, the white lighting system represents the first time the pilot has been provided with anything approaching daylight-type visual cues for landing. Pilots stressed the extent to which this visual information improved the landing approach. They indicated that with white lights it was possible to begin obtaining very useful depth perception and spatial orientation information as far as 2,000 feet from the carrier ramp. With this information, it was possible to determine the effect of minor corrections to the aircraft flight path much more readily. In summary, twenty-two of the twenty-five pilots indicated an unqualified preference for white lighting. One of these pilots stated that, "White lighting is without a doubt the most significant advancement in carrier aviation since the angled deck." The remaining three pilots preferred white for some activities and red for others. There was no consistency in the responses of these three individuals.

Table 5 summarizes the primary advantages noted for both the white and red floodlighting systems. These results indicate that each system results in a general improvement in the handling of aircraft and other equipment on the flight deck. However, the white lights are of considerable benefit during landing operations, also allow white lights to be used in hangar bay areas during flight operations, and, finally, contribute to an aviator's general feeling of confidence as he approaches the carrier at night.

As a final item in the interview, pilots were asked whether they felt that the use of white flight deck lighting meant a change from red to white lighting in the aircraft cockpit would be appropriate. On this issue, opinions were split on almost a perfect fifty-fifty basis, with strong voices being sounded on each side. Many aviators, who were quite favorable to the white deck lighting system, insisted that they still required internal red lights for such activities as formation flying, identification of weather build-ups, and perception of dimly lit ground targets.

Table 4
Use of Internal Red Lighting During Operation
of White Flight Deck Floodlighting

| Area | Red Used |
|---------------------------|-------------|
| Hangar bays and elevators | yes—12 |
| | no—10 |
| | Sometimes—3 |
| Readyrooms | yes—13 |
| | no—7 |
| | Sometimes—5 |
| Passageways and ladders | yes—20 |
| | no—1 |
| | Sometimes—4 |

Table 5
Assesment of Flight Deck Lighting Systems

| Advantages of White Floodlights |
|---|
| 1. Considerable aid during landing approach |
| 2. Improved aircraft deck handling |
| 3. Aid in taxiing |
| 4. Allows white lights in hangar bays |
| 5. Increased pilot confidence during night landings |
| Advantages of Red Floodlights |
| 1. Improved aircraft deck handling |
| 2. Aid in taxiing |

Other pilots, however, were quite adamant that all of these activities could be performed with equal proficiency if white lights were used in the cockpit. Apparently more study is required to resolve this issue.

In summary, the white flight deck floodlighting system has met with almost universal pilot acceptance. It provides for all of the improvement in aircraft deck handling activities noted for the red floodlights, and is decidedly superior as an aid for carrier landings. No significant problems were at-

tached to the use of the white light system. The implications of the use of this system for red versus white lights within the cockpit are by no means resolved. However, no information was obtained which would preclude taking advantage of the white flight deck floodlighting system while at the same time retaining the red light system for cockpit instruments.

(Paper presented by CAPT Roland A. Bosee, MSC USN, at AGARD Aerospace Medicine Panel, Brussels, Belgium, October 1967.)

EDITOR'S SECTION

CARDIAC TRANSPLANTATION

One of the major issues in cardiac transplantation is the problem of supply and demand, according to Dr. Theodore Cooper, Director of the National Heart Institute, the National Institutes of Health.

Dr. Cooper discussed this problem in the course of a cardiac transplantation symposium at the Scientific Sessions of the American Heart Association Meeting, November 21-24, in Bal Harbour, Florida. Other members of the discussion group were Drs. Eugene Braunwald, of San Diego, California; Grady L. Hallman, Houston, Texas; Richard R. Lower, Richmond, Virginia; and G. V. J. Nossell, Victoria, Australia.

Acquired heart disease kills about 200,000 Americans between the ages of 15 and 64 each year. "The 80,000 patients who die before they reach the hospital emphasize the great need for prevention," said Dr. Cooper. "Of the 120,000 who reach the hospital, about 40,000 might be restored to the community through currently available methods of therapy. The remaining 80,000 cardiac patients require some form of therapy which has either been unavailable or not applied in the past.

"In the case of 10,000 to, perhaps, 50,000 patients, all heart chambers are so heavily involved in the disease process that the patients require total heart replacement, either by a mechanical heart or by a transplanted one."

Dr. Cooper's assessment of the potential "supply" of donor hearts indicates impressive problems in logistics and preservation. Surveys have suggested that 70% of the people asked are willing to donate their bodies for medical research and therapy. The total pool of potential donors—that is, those aged

15-64 dying from causes other than heart disease or cancer—is only 260,000. If 70% of these were willing to donate their bodies, the pool of hearts available for transplantation would be 182,000. Not all of these would be suitable donors, however, since this group also includes people who die from infections, blood disorders and degenerative diseases.

"Past heart donors have come largely from victims of trauma or of spontaneous brain hemorrhage," Dr. Cooper added. "If this continues to be the case, the supply of potential donors dwindles to about 63,000 per year, thus increasing the 'supply' problem by three-fold."

"Moreover, matching even 182,000 reputedly willing donors with the possible 50,000 needy recipients would require solutions to present serious problems in organ preservation and transportation, as well as the development of extremely efficient matching systems functioning throughout the country."

The number of people who need a transplant, according to Dr. Cooper, depends in part upon the availability of other treatment resources. Many of the patients who presently die might be saved by improved methods of therapy less drastic than total heart replacement, provided that such methods could be developed and widely applied.

"Those people whose atria, right ventricle, and great vessels are still functioning adequately might be salvaged by temporary or permanent left-ventricular assist devices," Dr. Cooper said. "As the cardiopulmonary bypass machines and the cardiac pacemakers have shown, such temporary devices on a short or long term basis can be life saving. In addition, the average cost of the application or insertion of such assist devices would probably be some-

what less than the estimated cost of \$50,000 for total replacement, whether it be by total artificial heart or by heart transplant."

These implantable artificial assist devices will undoubtedly be available in the future, according to Dr. Cooper, who concluded: "A great deal of work is yet to be done in determining and developing the best power source, in creating and testing the best materials, in constructing and miniaturizing the best pumping mechanism; but the problems have been defined and the answers can be found if we have effective leadership and imaginative and diligent investigation."—USDHEW, NIH, National Heart Institute, Bethesda, Md.

DRAINAGE TUBES FOR CATARRHAL OTITIS MEDIA—IMPROVEMENT

Drainage tubes for catarrhal otitis media can be made from polyethylene tubing rather than through open purchase. They are inserted through the ear drums in order to provide continuous drainage. This is a common problem in the Ear, Nose, and Throat department.

The more expensive tubes can be replaced by the polyethylene tubes at great savings. Because of the very extensive nature of the problem, the monetary savings Navy-wide should be very considerable.

Directions for preparing polyethylene tubes for insertion through tympanic membrane after myringotomy:

"Cut polyethylene 190 tubing about $\frac{3}{4}$ inch long and on a thirty degree angle. Touch the angled end to open flame to form a bevelled end. A wire is then run through two tubes for convenience in handling and they are gas sterilized."—HM2 Stella J. Kroeze, NNMC, Bethesda, Md. Activities adopting this suggestion are requested to notify the CO, National Naval Medical Center, Bethesda, Md. 20014 by Navy Incentive Awards Transmittal Letter NAVEXOS 12450/10.

800 ATTEND ASSOCIATION OF MILITARY SURGEONS MEETING IN JAPAN

The U.S. Naval Hospital, Yokosuka, Japan, was the scene of the Second Annual Tri-Service Meeting of the Far East Chapter, Association of Military Surgeons. Over 800 health service professionals from the U.S. Army, Navy, Air Force and Public Health Service, attended the two day meeting. At opening ceremonies on October 31, CAPT Arthur R. Errion, Force Medical Officer of the U.S. Naval Forces Japan and Presiding Officer, introduced

RADM John S. Cowan, Medical Officer, Commander in Chief, Pacific Fleet, who delivered the keynote address. RADM Cowan's address focused on "Team Concepts in Medical Care," the theme of this year's program. Many Japanese Military Medical dignitaries were also present, including the Honorable Dr. H. Hamada, Director, Medical Bureau, Japan Defense Agency.

During the two day meeting, 125 professional papers were presented at the five major section meetings—medical, dental, nursing, administrative and allied sciences, and veterinary. Since U.S. military "health care teams" function in areas which support the military effort in Vietnam, many of the papers that were presented focused on the treatment of battle casualties and diseases that are endemic to Far East Asia. In addition to the presentation of professional papers, 25 commercial and educational exhibits were displayed for review by the meeting attendees.

The Far East Chapter encompasses a large geographical area, including Korea, Ryukyu Islands, Republic of Vietnam, Taiwan, Thailand, Philippines, Mariana Islands, Malaysia, Hawaii and Japan, all of which were represented. This year's meeting will be hosted by the U.S. Air Force.—Naval Hospital, FPO Seattle.

PSYCHOLOGICAL ASPECTS OF STRESS

What: A one and one-half day symposium conducted by the University of Virginia and Medical Education for National Defense

Where: Newcomb Hall, University of Virginia School of Medicine, Charlottesville, Virginia

When: April 23-24, 1969

Program Preview

Topics: "Precognitions of Disaster"

"Psychological Reactions to Life Threatening Illnesses"

"Psychological Reactions to Sensory Deprivation and Isolation"

"Psychological Response to Concentration Camp Survival"

"Psychological Reactions to the Stresses of Outer Space"

"Psychological Aspects of Emergency Situations"

"Psychological Aspects of Combat"

Speakers: In addition to the chairman and staff

of the Department of Psychiatry, guest speakers will include:

Thomas P. Hackett, M.D., Boston, Mass.
John C. Lilly, M.D., Catonsville, Md.
Paul Chodoff, M.D., Washington, D.C.
Edward J. McLaughlin, M.D., Washington, D.C.
Albert J. Glass, M.D., Oklahoma City, Okla.
Peter Bourne, M.D., Palo Alto, Calif.

Additional Info: Harry S. Abram, M.D.
Associate Professor of Psychiatry
Univ of Virginia School of Medicine
Charlottesville, Va. 22901
or
Mrs. Joyce T. Via
Administrative Officer for
Medical Education for National
Defense (MEND) Program
2300 "E" Street, N.W.
Washington, D.C. 20390

CONFERENCE TRAVEL FOR MEDICAL OFFICERS

All Medical Officers should be familiar with the provisions of SECNAV INSTRUCTION 4651.15A which provides guidance for attendance at professional meetings, conferences, symposia, and seminars.

Historically, this instruction results from a memorandum issued 17 April 1967, by the Deputy Secretary of Defense which stated that "it is desirable that all Medical Corps Officers stationed in the United States be offered an opportunity to attend

at least one professional medical conference per year on a temporary additional duty basis and that those stationed outside the United States should have the same opportunity, to the extent that their location and military operations permit." The prompting force behind the issuance of the DOD Memorandum was a recommendation in the Report of the Retention Task Force which stated that the inability to continue professional growth is a strong determining factor in the young medical officer's decision to leave the Naval Service.

Funds in support of the program outlined in SECNAV INSTRUCTION 4651.15A were included in Expense Operating Budgets of Naval Hospitals and other activities under the financial support of BUMED. Commands (less BUMED command activities holding Expense Operating Budgets under the appropriation Operations, Navy) are authorized to cite accounting data for centrally held funds. Requests for attendance at civilian sponsored meetings, conferences, symposia, short courses and seminars should be made on the NAVEXOS 12000/2 which may be approved by Commanding Officers of Naval Hospitals or by the first echelon in the chain of command having approval authority in the case of medical officers who are attached to other than BUMED Command Activities.

In order to keep a complete history of medical officers' participation in continuing education, it is essential that copies of all Temporary Additional Duty orders be forwarded to BUMED and BUPERS in accordance with the procedures outlined in SECNAV INSTRUCTION 4651.15A.—Training Branch, BuMed.

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